POPULAR Computing WEEKLY

35p 3-9 February 1983 Vol 2 No 5

This Week

Vic Adventures
Mike Grace looks at the new adventure games being released for the Vic20. See page 12.

Copyright
Gail Counsell unravels some of the copyright problems facing lending libraries and software pirates. See page 10.

ZX machine code
Geoff Wilkins introduces two new machine code routines to add extra commands to your ZX Spectrum. See page 22.

Dragon graphics
David Lawrence continues building up a program from his book *The Working Dragon*. See page 25.

★STAR GAME
Tank Battle on BBC Model B by John Meredith
See page 8

News Desk

TS2000 with new look silver finish

VARIATIONS on a theme. The new-look Spectrum — the TS2000, and ZX Printer — the TS2040, have been specially designed by Timex for the American market.

Apart from its silver exterior styling the TS2000 is the same as its familiar UK counterpart. It will sell in the US for £95 (16K) and £127 (48K), available in the late spring.

The TS2040 printer is larger than the British ZX Printer, and will sell for less than £65.

As Timex announced the TS2000 machine, the company also cut the price of its TS1000 machine (the ZX81 equivalent) by £10. The price drop takes the form of a rebate coupon and the offer applies only for a limited period until March 31.

Summer plan for Binatone

THE BINATONE Personalized Computer, originally scheduled for launch in December last year, is now planned for launch in early summer.

"We are hoping for a launch date in May or June and we are still aiming for a colour computer for around the £50 mark," said Binatone Sales Manager, Stephen Oliver.

The budget home computer will feature a full-size push-button keyboard, 16 colours, high resolution graphics and 16K Ram expandable up to 64K. The on-board 12K Rom will run a version of Microsoft Basic. The screen display format will be 64 characters × 16 lines.

The computer will be fully portable with a built-in power supply, cassette drive unit and RS232 interface. The printer output will be 80 characters per line.

It will be made in the Far East. Binatone is looking for 300,000 sales through high-street stores.

Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

SHARP MZ80K, 48K, books and mags, £200 ono. 01-804 0500.

TI 99/4a, one year old, software Video Chess, Household Management, Munchman, Mini-memory. £170 ono. C. H. Collier. Tel: 01-831 8244 (daytime).

DRAGON 32, three months old, boxed, £150. Horley (02934) 75547 (after 8 pm).

VIC20, 8-16K Ram, super expander, joystick, Vic Revealed. Nottingham 324376 after 5 pm.

WANTED ATARI 800. Must be in good condition. Tel: 571 1309 after 7 pm.

For Sale

3K RAM PACK for Vic20 wanted. Tel: 559 2791.

SPECTRUM 48K COPY TAPE

With this utility you can copy any Spectrum File Type (program, code or arrays) up to 40K, quickly and easily. Complete with full instructions and details of how to deal with certain "Copy Proof" Files. £4.95

N. G. EDWARDS
25 DALES DRIVE, WIMBORNE, DORSET

COMMODORE VIC20 + cassette unit and graphic printer and paper. All in excellent condition. Offers over £300. Tel: Lincoln 682660.

WANTED VIC20 Super Expander cartridge. Will swap for 8K Ram + Road Race cartridge. Tel: Colchester 869194 after 7 pm.

SHARP PC 1211, with printer interface. £65. Tel: 0773 812766.

DRAGON 32 or TANDY TRS-80 Colour? Lots of programs — lots of useful hints and information EVERY single month in "RAINBOW", an exciting new 200-page magazine from USA. Send £1.95 (plus large 56p p. & p.) for sample issue to **ELKAN ELECTRONICS** (Dept. PCW), **FREEPOST**, 11 Bury New Road, Prestwich, Manchester M25 6LZ or telephone 061-798 7613 (24-hour service).

MATEL INTELLIVISION games cartridges. Bowling, Triple Action, Auto-racing, Sea Battle, + Backgammon, £10 each. Tel: Bath 834595.

TANDY TRS80 Pocket Computer + cassette interface, 6 months old, £65 ono. Mr H. Hall, 41 Dodmoor Grange, Randley, Telford TES 2AT. Tel: 0952 594959.

DISCOUNT BOOKS
Large range of computer books for everyone from hobbyist to businessman at discount prices. Send large sae for list. **Spectrum Graphics by N. Hampshire, 6.45 Farmsery, Rowcliffe, Brook End, Keysoe, Beds MK44 2HR**

Continued on page 28

NEW SPECTRUM AND ZX81 SOFTWARE

"WINGED AVENGER"

Fast and furious. SPECTRUM version has SOUND and USER GRAPHICS. 7 LEVELS, 3 WAVES, MOTHER SHIP, HIGH SCORE, RE-FUELLING, RAPID FIRE, SMART BOMBS and LASER SHIELD. PCW "ONE OF THE BEST SINCLAIR GAMES YET". Only £4.50. All SPECTRUM + 16K ZX81.

"SPECTRUM SCRAMBLE"

MORE M/CODE ARCADE ACTION. "SO GOOD THE REVIEWERS DIDN'T REACH THE FINAL STAGE" (NOT BAD EH!). NO LESS THAN 8 DIRECTIONAL KEYS for a SMOOTH MOVE. Full ARCADE features including, LASERS, BOMBS, INSTANT RESPONSE, CONTINUOUS SCORING, ROCKETS, SOUND, FUEL DUMPS, RED METEORS, DEFENDER CRAFT and HIGH SCORE. Beware CONDITION RED. With this one you MOVE, FIRE and BOMB AT THE SAME TIME. RELEASE PRICE of £4.95. 16K or 48K SPECTRUM.

"DO NOT PASS GO"
NOW THE 48K SPECTRUM VERSION IS READY

A COMPLETE SIMULATION of the BEST SELLING BOARD GAME, you know PARK LANE and all that. Up to SIX PLAYERS can compete with the MICRO doing all the WORK. Acts as DICE THROWER, BOARD, RENT COLLECTOR, UMPIRE, BANK, RULE BOOK, ACCOUNTANT and PROPERTY RECORD. SUPER GRAPHICS by Gary Kennedy (thanks mate). GAME SAVE with winner so far report. COMPLETE with INSTRUCTION BOOKLET. The ULTIMATE in FAMILY GAMES. Don't MONOPOLISE YOUR MICRO. AMAZE all your friends and family. (Can you see your GRANNY on a MICRO?) ONLY £6.95. 16K ZX81 VERSION ALSO £6.95.

"BASE INVADERS"

The ONLY ARCADE GAME EVERYBODY SHOULD HAVE. The SCREEN'S the same, THE INVADERS are the same, BUT you get a SHIELD and a CHOICE of THREE SPEEDS, (O.K., FAST or INCREDIBLE). GOOD SOUND, a HARD GAME, and GREAT GRAPHICS. COMPLETE your software collection for just £4.50. 16K and 48K SPECTRUM only.

"AUDIO SONICS"

WINNER of WIZZ KID 82. For the SPECTRUM. A.S. writes sound effects for your own programs. 26 PRE-SELECTED SOUND EFFECTS include TELEPHONE, POLICE SIREN, FROG, SPACE EFFECTS and OUTBOARD MOTOR. GO into MODIFY and you are presented with a display of SLIDER CONTROLS to adjust PITCH, RISE, FALL, BRISKNESS, DECEL, ACCELL, TONE, REPEAT RATE, STUTTER and DELAY. ADJUST the SLIDERS then INSTANTLY hear the SOUND CREATED. Call "THE SOUND ONE" and a program line will appear that is ready for insertion into your own programs. Hours of EXPLORATION. YOU WILL BE AMAZED what BEEP can DO. We are proud to offer this at £4.99. 16K or 48K SPECTRUM.

"SPECTRUM RENUMBER DELETE"

All M/CODE RENUMBERS ALL NOT PART. "YOU WON'T BUY A BETTER RENUMBER PROGRAM FOR THE SPECTRUM" JUST 900 BYTES. At £4.95. ALSO ZX81 VERSION.

"HIGH NOON"

When YOU'VE SAVED the GALAXY, SCRAMBLED or whatever else you do on your MICRO, what about a GUNFIGHT? Play the SPECTRUM or YOUR PALS. THREE LEVELS. FULL FEATURES, CACTI, COFFINS, WAGONS, RAPID or SINGLE SHOTS. SUPERB GRAPHICS. GOOD SOUND including DEATH MARCH. ESCAPISM on TAPE for JUST £4.50.

"DISPLAY"

Takes over when BIN and the DEMO tape left off. How would you like 273 different user defined GRAPHICS on a 16K SPECTRUM or a GRAND 336 for a 48K. All of these can be displayed on the screen at the SAME TIME. UDGs are stored as PAGES and any TWO PAGES may be exchanged in memory. FILES can be LOADED FROM or SAVED TO TAPE. LOAD into any page location. TURN a UDG ¼ turn, ½ turn, FLIP a SHAPE over, REVERSE a SHAPE, EXPAND ¼ of a CHARACTER into a full character, UP, DOWN, LEFT or RIGHT by one PIXEL. 5 SHAPE FILES are included on TAPE, INCLUDING a 64 CHARACTERS per LINE DISPLAY. COMPLETE with DEMO PROGRAM and INSTRUCTIONS. JUST RELEASED at £7.00. 48K or 16K SPECTRUM only.

"TRaceON"

BASED on a FILM (GUESS WHICH). TRaceON is a REAL TIME ADVENTURE for those of you who can't handle ARCADE GAMES. Your TASK is to COMPLETE a TRILOGY of GAMES successfully. A poor PERFORMANCE will result in a RESTART as may CHEATING. MASTER the DISKS and YOU get to ride a LIGHT BIKE and then RUN the CORRIDORS of DEATH to reach the MASTER CONTROL. REALLY GOOD FRUSTRATING FUN. 48K SPECTRUM £4.50 (16K coming soon.)

"MATCALC"

For BUSINESS and PROFESSIONAL use. Ideal for WHAT IF situations, CASH FLOW FORECASTS and analysing RELATED figures. 64 character display option. FORMULA may be MATHEMATICAL or LOGICAL. MENU of FUNCTIONS. SAVE and LOAD DATA to TAPE. FULL instructions included. LITERALLY HUNDREDS of USES. BOTH 48K and 16K SPECTRUM PROGRAMS on ONE TAPE. JUST £7.00. EXCELLENT VALUE.

"PROGRAMMERS DREAM"

A SPECTRUM TOOLKIT. Position independent and just 1450 BYTES. Facilities RENUMBER lines or blocks any increment or start. BLOCK OR LINE MOVE including a RENUMBER into place if required. BLOCK OR LINE ERASE. CHANGE SELECTED STRINGS (NAMES OR CONTENTS). DUMP variable names and values (usable in a loop). DISPLAY PROGRAM or PROGRAM plus VARIABLE SIZE. INSTANT and CLEAN. JUST £5.95 with explicit instructions.

WORK FORCE

140 WILSDEN AVENUE, LUTON, BEDS, ENGLAND
ALSO AVAILABLE AT BUFFER, MICROWARE AND SOFTWARE SUPERMARKET.
REMEMBER WORK FORCE WORKS HARDER.

VIC·20 GAMES

Top quality software from N. America from . . . for each program

£1.14
Until Feb. 12th

CASSETTE 1
New York Blitz, Space Shuttle
Super Trap, Kentucky Derby

CASSETTE 2
3-D Maze, Hangman
5-Pin Bowling, Tennis

CASSETTE 3 (Joystick)
Frogger
Boxing
Sky Diver

CASSETTE 4 (Joystick)
Lunar Lander
Paddle Bug
Doggie Biscuits

All programs for unexpanded VIC
Any single cassette (3-4 games) **only £6.95**
Any two cassettes (6-8 games) **only £11.95**
All four cassettes (14 games) **only £15.95**
FREE Character Editor program with every order
GUARANTEED service and delivery

Galactic Software

Send Cheque/P.O. to: Galactic Software, The Willows, Lambrook Road, Shepton Beauchamp, Somerset TA19 0LZ. Tel: (0460) 40744

ROMIK SOFTWARE

24 Church Street, Slough SL1 1PT. Telephone: Slough (STD 0753) 71535

SHARK ATTACK
For unexpanded Vic20
You are in shark-infested waters after being thrown overboard from a pirate ship. Your only protection being an atomic net which you trail behind you, trying to cover all the visible ocean and ensnare the sharks at the same time. Beware of stopping or covering your tracks for too long, if you do, then the sharks will escape and come after you. Watch out for the ever increasing deadly octopuses (sometimes the sharks will eat part or all of one!)

MOONS OF JUPITER
For expanded Vic20, 3K, 8K or 16K
You are the Commander of a fleet of destroyers looking on from the safety of a mother ship, you send in one destroyer at a time to blast a passage through the **MOONS OF JUPITER. Your destroyers have to dodge, and blast the UFOs . . . Watch out for the Gulops** they can smash your destroyers, but you cannot harm them.

A Machine Code
Arcade Quality Game

SEA INVASION
Unexpanded Vic20
Fight off the attacking sea creatures for as long as you can. Shoot the whale for a surprise score, watch out for the crabs, starfish and octopuses.

MARTIAN RAIDER
For unexpanded Vic20
Skim as close as you dare to the surface of the planet, devastating the Martian cities, destroying ammunition dumps (gaining more time), shooting down the ground-to-air missiles.

SPECIAL OFFER . . .
C4 COMPUTER CASSETTES
£2.99 for 10; £29 for 100
Available post free from the above address only

ROMIK PROMISE A MINIMUM OF ONE NEW GAME EVERY MONTH

MULTISOUND SYNTHESIZER
For the unexpanded Vic20
The Vic Multisound Synthesizer is very flexible and can be played in more ways than can ever be explained here, to create music and special effects. For example, create any tune, up to 255 notes (after following appropriate instructions), then press "F1" or "F3", then key "9" and enjoy the added effect. Now hit "+", listen to the difference. For a surprise — hit "-". Now add a melody over the top — hit key "8" then "7" — now play a melody, or experiment. *Have fun!*

MIND TWISTERS
For unexpanded Vic20
Four games to stretch your brain
Blackjack, Decipher, Four Thought and Teaser are our computerised versions of very popular home games and will test your mental agility and skill for many a long hour.

SPACE ATTACK
For the unexpanded Vic20
Space Attack is a game of skill. You as the pilot of an intergalactic battleship have to fight your way through wave after wave of various alien spaceships.

ALL PROGRAMS ARE £9.99

Machine Code Arcade Quality Game
STRATEGIC COMMAND
Our first game for the Dragon
A strategy game for two players. Will keep you active for many hours. Air, sea and land battles!
ALL PROGRAMS ARE £9.99

OUR GAMES ARE AVAILABLE FROM ALL GOOD HOME COMPUTER STORES

POPULAR Computing WEEKLY

3-9 February 1983 Vol 2 No 5

The Team

Editor
Brendon Gore

News Editor
David Kelly [01-930 3271]

Sub-editor
Ninette Sharp

Editorial Assistant
Theresa Lacy

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3260]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2
Telephone: **01-839 6835**

Published by Sunshine Publications Ltd.

Typesetting, origination and printing by Chesham Press, Chesham, Bucks

Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643

Subscriptions
You can have *Popular Computing Weekly* sent to your home:
UK Addresses
26 issues **£9.90**
52 issues **£19.95**
Overseas Addresses
26 issues **£18.70**
52 issues **£37.40**

How to submit articles
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

Editorial

Artificial Intelligence is a topic that is attracting increasing interest, both in the media and in the laboratory.

With hard and software expertise seemingly growing at an almost exponential rate, the idea of a "thinking" computer is no longer ridiculous. It is not so much a question of "If" so much as "When".

But, while a number of people are devoting themselves to the mechanics of producing Artificial Intelligence, few people seem to have given much thought to the consequences. If computers can be devised that genuinely think, as opposed to simulating thought, will they be regarded as a new life form? If so, will they have the same rights as humans and will it become murder to switch them off?

These questions might seem a little fanciful, but they will have to be answered all the same. A thinking computer could quite conceivably develop needs and desires of its own that could conflict with those of its creators. How would such conflict be equitably resolved?

If we succeed in creating Artificial Intelligence, we shall have to recognise that there is a price to pay. A computer with free will may be a dependant, it will not be a servant.

Next Thursday

Enter the Cavern, a new game for the 16K Spectrum, by David Leitch. Also, Tony Bridge presents a review of the latest software for the still strong ZX81 David Kelly interviews the men behind the Oric-1 computer to assess the reality of their dream to do for the rest of the world what Clive Sinclair has done for Britain.

VIC20
SOFTWARE LIBRARY

Hire your VIC20 Programs from only 50 pence plus p&p.

Huge selection of software to choose from, plus two offices to handle your orders.

A personal service for your personal computer, from Les and Des at Sovereign.

Send **£9.50** (cheque or postal order) for membership, program list, first order form and a chance to win an 8K expansion for your VIC!

SOVEREIGN SOFTWARE LIBRARY

101 Somersall Street
Mansfield
Notts

48 Rannoch Drive
Mansfield
Notts

SEE US AT THE . . .

6th ZX MICROFAIR

AMAZING NEW PRODUCT
TELESOUND 84
BBC/SPECTRUM SOUND BOOSTER

Telesound 84 outputs the computer sound direct through your unmodified TV set. Sound effects then can be controlled from a whisper to a roar. Three easy snap-on connections eliminate soldering.

Telesound 84 measures 2½ x 2 x 1½ cm. and requires no separate power supply. This unique device (patent pending) uses some of the very latest ultra miniature components and costs only **£9.95** inclusive of post, packing, etc.

Full instructions with connection diagrams are supplied so that the unit can be fitted in minutes without any previous experience.

Cheques/PO to

COMPUSOUND
32 Langley Close
Redditch, Worcs. B98 0ET

Please state your computer when ordering

C☆TECH SOFTWARE

Is this the end of
SPACE INVADERS
as we know it?

KONG
An Unbelievable Video Game from C Tech. If you want the latest in Software then this is for you.

The Program begins with a full colour KONG jumping across the screen causing the stairway to tilt out of place, then your man must run up the ladders avoiding KONG'S barrels to rescue his girl.

The final scene has lifts and fireballs all in full colour, sound and with M/C subroutines.

PANIC
ISLAND
The Standard Panic Program has been modified to produce Panic Island, where you must bury Monsters and hunt for buried Treasure... ...before they hunt you.

KRAZY KONG

plus
Panic Island

FOR THE 16K OR 48K
SPECTRUM £5-00

SPECTRUM ARCADE PACK

CITY BOMBER, POLECAT, BREAKOUT, SUBHUNT, CRAZY RACE, FRUIT MACHINE, MISSILE COMMANDER, AND LUNAR LANDING **£5.00**

8 Brilliant Games for only £5.00, incl. p&p

Available now in good computer shops, and mail order.

VISA

184 Market Street, Hyde, Cheshire 061 366 8223

Oric switches out of mail order

ORIC Products International is to discontinue mail-order sales of its Oric 1 microcomputer almost as soon as they have begun.

This change in sales policy will mean that by March the Oric will only be available through an appointed dealership network and selected high-street stores. So far the company has received more than 2,000 orders from mail-order customers.

"Oric now believes that there is only one way to sell a home microcomputer — and that is retail," said sales director Peter Harding.

A number of deals have already been concluded which will put the computer into the high street by April.

From April onwards W H Smith will be stocking the 48K machine. Although Oric claims that W H Smith will take more than 45,000 machines in 1983, a spokesman for the store would only confirm that W H Smith will be taking the computer "in substantial quantities".

The Spectrum chain, Laskeys, Greens and Curry's Micro C have also agreed to stock the computer. Microperipherals and Tangerine (designers of the Oric 1) will act as dealers.

"As with any product it takes time to get up to high-volume production," explained Peter Harding. "But we hope to be out of mail-order by March this year."

Distribution deals have also been signed in France, Germany, Spain, Belgium, Scandinavia, Greece, Singapore and Portugal. Oric is also considering manufacture of the Oric 1 under licence in the USA, Japan, India and Latin America.

At present the company assembles and tests the printed-circuit boards in two operations running in Singapore. The cases are made and final assembly is undertaken at Kenure Plastics in Feltham.

● Oric has announced preliminary details of a range of peripherals for the machine. The Modem is planned for the end of April, priced at £79. A four-colour, plain-paper printer is planned for the same time, priced around £150. Joysticks and double-sided double-density 5¼ inch disc operating systems are scheduled for the end of May.

Bug-Byte, Artic and Salamander will be producing software for the machine — the first programs should be available in March.

Atari signs big names

A VIDEO game based on the story and characters in the Speilberg film *Raiders of the Lost Ark* is just one of the projects in the pipeline, arising from a series of licensing agreements concluded by Atari.

Other well-known faces soon to appear on Atari products are such characters as Mickey Mouse, Snoopy, Woodstock and all the gang from the Peanuts strips.

According to Graham Daubney, Atari's UK Software Manager, the licences apply to both the Atari 400 and 800 computers and to the Atari VCS games machine system. "We will be using the characters, not just in arcade-type games, but also in a range of educational adventure games for younger children," he said.

To accompany the new software for four to seven year olds Atari has announced a controller for the VCS machine with colourful 'chunky' keys.

Harrison Ford in Raiders of the Lost Ark.

Commodore gives voice

A SOPHISTICATED voice synthesizer add-on has been announced for the Commodore 64 microcomputer.

Developed by Commodore's Speech Technology Division in Dallas, Texas, the low-cost I/O unit can produce a variety of different voices — male, female, a child's or that of a cartoon character.

The Speech Cartridge plugs into the Rom slot on the Commodore 64 machine. It is addressable from the keyboard and operates using the Basic command word *Say*. A typical program construction might be *Say* "Thank you".

The most interesting application of the voice unit will be to add speech as an integral part of a program. Using the cartridge it will be possible to make the characters in an animation sequence speak — with different voices for the different characters.

Also supplied in the Rom cartridge is a learning program to help teach the alphabet.

The speech synthesizer is planned for the second quarter of 1983, and will cost £65.

Distribution by John Wiley

JOHN WILEY and Sons is to market and distribute Acornsoft's range of software and book titles.

John Wilson, Wiley's computer publications editor, commented: "We found an increasing awareness in the book trade for software and we have agreed to handle Acornsoft's titles."

Acornsoft will continue to promote its material direct but, according to John Wilson, although "the spirit of our agreement is that Wiley will concentrate on its established outlets, Acorn dealers will be able to get software from us if they wish."

The arrangement between the two companies applies to the UK, the rest of Europe and Africa.

More micros get government approval

MICROCOMPUTERS purchased for use by government departments are more likely to be British-made, following the announcement of new guidelines.

The Treasury's Central Computer and Telecommunications Agency which advises on such things has produced a new list of manufacturers approved by the government.

Of the 12 new companies on the list, seven are British — including ICL, Comart and Torch. Those removed from the list include Commodore and Research Machines.

David Broad, chairman of the British Microcomputer Manufacturers Group said that, although the new list was an improvement, many good British companies were still missing from it.

Lisp for Spectrum

SERIOUS Software has developed a Lisp interpreter for the Spectrum.

The artificial intelligence language is contained in just over 7K of code. Features include over 50 predefined functions, iteration via *Progn* and *While*, a variable number of parameters to user-defined functions, full property list implementation and full error checking.

The cassette, together with demonstration program and programmers' manual, is available for £15 from Serious Software, 7 Woodside Road, Bickley, Bromley, Kent.

THE DRAGON DUNGEON

DRAGON STICKS!

Top quality joysticks, for the Dragon owner who demands arcade action. Ultra-sensitive, but tough and reliable, Dragon Sticks will keep on zapping when others fail! £19.95 per pair inclusive VAT and postage.

DRAGON'S TEETH

Our monthly Club Letter will shortly emerge from the depths of the Dungeon, where insomniac games-testers crouch chained to their Dragons, endlessly reviewing the latest software for your benefit.

If you have identified any of those elusive addresses, have spotted any programming quirks of the 6809 or have any tips to assist fellow Dragon-bashers, send them along to the Dungeon.

'Dragon's Teeth' is full of news, reviews, information and products. The Annual Subscription, which includes software discount offers is £6.00 (six-month trial subscription £3.25).

Copies of David Lawrence's 'The Working Dragon 32' now in stock, £5.95 post-free.

The Dragon Dungeon is always on the lookout for innovative software which exploits the Dragon's colour and sound potential, against royalty, outright purchase or sales agency. Secrecy Agreement exchange against unprotected tapes sent for evaluation.

We should also like to get in touch with experienced programmers, who can translate detailed games concepts into working software on a contract basis.

THE DRAGON DUNGEON

PO BOX 4, ASHBOURNE, DERBYSHIRE DE6 1AQ. TEL: ASHBOURNE 44626

DRAGON 32

SOFTWARE LIBRARY

- **MEMBERSHIP FEE : £10.00**
- **HIRE FEE : £1.00 PER TAPE PER FORTNIGHT**

Micro Care have an extensive range of tapes and cartridges, including Arcade-type games, educational programs, adventure games and utilities Our aim is simply to be the biggest and best software library service catering exclusively for the Dragon 32

If you request a program we don't have, and if we consider it suitable, **we will buy it!**

Send **£10.00** cheque or postal order for membership card, order form, Dragon Fact Sheet and discount offer of Micro Care products

MICRO CARE

1 OAKWOOD ROAD, RODE HEATH, STOKE-ON-TRENT

Telephone: (09363) 5695

Poking into memory

In the January 6 edition of *Popular Computing Weekly*, David Nowotnik presented a program to allow easy *Poking* to the Spectrum display memory. The routine was a mixture of Basic and machine code, with the result that it was not very fast.

The routine could have been written entirely in machine code — Figure 1 is a disassembly of just such a routine. David's expression for calculating screen addresses was also a little confusing, but Diagram 1 should make the method a bit clearer.

Program lines 10 to 90 of Figure 3 will locate the routine in the printer buffer, 23296. The desired *Y,X* co-ordinates should then be *Poked* into 23297, 23298 respectively. The routine is completely relocatable, just remember to *Poke* *Y,X* into the start address + 1, start address + 2. The result of the calculation is returned in *BC*, so a *Usr* call will return it directly to a variable if desired.

Figure 2 is another machine code routine for calculating screen addresses, only this time it will convert the address in *HL* to its Spectrum equivalent. The address in *HL* is the value you would expect to use if the Spectrum screen memory was arranged in a conventional manner, ie:

Line 0, Column 0 = 4000 H, 16384 D
Line 1, Column 0 = 4020 H, 16416 D
Line 2, Column 3 = 4043 H, 16451 D
and so on.

The conventional address can be calculated by: 16384 + 32 × line + column where line is in the range 0-191 and column is in the range 0-31.

While this may not seem very useful to the Basic programmer, where using *X,Y* co-ordinates is the usual method, it is very useful to someone using machine code where a single 16-bit address is often more convenient. Using this routine allows you to move blocks of the screen around using conventional addressing techniques and calling the converter to translate into 'Spectrumese'.

Like the first routine, the result is returned in *BC* but it does not allow you to *Poke* in the data from Basic. If you wish to use the routine from Basic you should add a *LD HL, nn* instruction (33, 0, 0) to the start and then *Poke* in the value as in the first program.

Remember though that here it expects an address, not co-ordinates.

This routine is also relocatable — the loading program in Figure 3 lines 110 to 200 locate it at 23321. Also, bear in mind that the listings in Figures 1 and 2 is in Z80 assembler and should not be entered as part of a Basic program.

Larry Carasco
43 Broadfield Close
Dollis Hill
London NW2 6NR

```
5B00   21 00 00     LD    HL,#0000
5B03   7D           LD    A,L
5B04   E6 07        AND   #07
5B06   C6 40        ADD   A,#40
5B08   47           LD    B,A
5B09   7D           LD    A,L
5B0A   E6 C0        AND   #C0
5B0C   1F           RRA
5B0D   1F           RRA
5B0E   1F           RRA
5B0F   80           ADD   A,B
5B10   47           LD    B,A
5B11   7D           LD    A,L
5B12   E6 38        AND   #38
5B14   17           RLA
5B15   17           RLA
5B16   84           ADD   A,H
5B17   4F           LD    C,A
5B18   C9           RET
```

Fig. 1 X,Y converter.

```
Breakdown the Y co-ord like so:

          10    111    111  = #BF
          └┘    └─┘    └─┘
     ┌─────┘     │      └─────┐
   Add #800   Add #20   Add #100
   per bit    per bit   per bit

eg. Y=#BF (191 decimal), X=5

So address=
#4000+(2*#800)+(7*#20)+(7*#100)

=#4000+#1000+#E0+#700

=#57E0 + X= #57E5
```

Diag. 1 Address calculation.

```
5B19   7C           LD    A,H
5B1A   26 40        LD    H,#40
5B1C   94           SUB   H
5B1D   47           LD    B,A
5B1E   E6 18        AND   #18
5B20   84           ADD   A,H
5B21   67           LD    H,A
5B22   7D           LD    A,L
5B23   4F           LD    C,A
5B24   E6 E0        AND   #E0
5B26   17           RLA
5B27   17           RLA
5B28   17           RLA
5B29   17           RLA
5B2A   84           ADD   A,H
5B2B   67           LD    H,A
5B2C   78           LD    A,B
5B2D   1F           RRA
5B2E   1F           RRA
5B2F   1F           RRA
5B30   1F           RRA
5B31   E6 E0        AND   #E0
5B33   6F           LD    L,A
5B34   79           LD    A,C
5B35   E6 1F        AND   #1F
5B37   85           ADD   A,L
5B38   4F           LD    C,A
5B39   44           LD    B,H
5B3A   C9           RET
```

Fig. 2 Address converter.

```
 10 FOR a=23296 TO 23320
 20 READ b: POKE a,b
 30 NEXT a
 40 REM X,Y Converter
 50 DATA 33,0,0,125,230
 60 DATA 7,198,64,71,125
 70 DATA 230,192,31,31,31
 80 DATA 128,71,125,230,56
 90 DATA 23,23,132,79,201
100 REM
110 FOR a=23321 TO 23354
120 READ b: POKE a,b
130 NEXT a
140 REM Address converter
150 DATA 124,38,64,148,71,230
160 DATA 24,132,103,125,79,230
170 DATA 224,23,23,23,23,132
180 DATA 103,120,31,31,31,31
190 DATA 230,224,111,121,230,31
200 DATA 133,79,68,201
```

Fig. 3 Decimal data.

Action on libraries . . .

I thought you might be interested to know the position of Bug Byte Software in relation to software lending libraries.

We are thoroughly opposed to all forms of lending, hiring, or exchanging by such bodies, and are prepared to take legal action to protect our interests.

It would appear that other major software houses have a similar view and we would therefore be obliged if you would consider withholding any future advertisements from software lending libraries.

A D Baden
Bug Byte Software
98-100 The Albany
Old Hall Street
Liverpool L3 9EP

. . . or business threatened

After your recent article concerning software lending libraries, *PCW* January 6 *1983*, it has come to our attention that there has been a marked increase in the activities of these outfits.

As an independent software house the success of our business depends on there being sufficient customers for our products.

If, however, those customers can easily obtain a copy of the cassettes from a lending library which pays no royalties, licensing fees or compensation for loss of sales, then I am sure you will agree that this type of business is both bad for ourselves and for the industry as a whole, which includes your magazine.

I would appreciate some information as regards your views on this matter and also the general feeling amongst other software suppliers.

Douglas Bern
Silversoft
20 Orange Street
London WC2H 7ED

We have now received several letters from software companies expressing concern about the recent growth in lending libraries. The view of most of these companies is that the business of lending out taped software is illegal, especially if permission has not been obtained first. As Gail Counsell explains, on page 10, the law is not so simple.

It is our view that the sensible way forward is:

(a) Each cassette should display a message, in a prominent position on the outside, stating that it is a condition of sale that the cassette will not be hired or lent.

(b) A group or association of software companies should club together to enforce the contract in (a).

***Popular Computing Weekly* would be quite happy to hear from any software companies interested in such an approach.**

Tank Battle

A new game for the BBC Model B by J Meredith

This program, for a Model B BBC Micro simulates a tank battle. The object of the game is to destroy the enemy tank before it destroys you. The computer controls the black tank while you control the yellow tank.

There are 40 white barriers which give protection to the player's tank. If either tank drives over a barrier it is destroyed. When a missile shot from either tank hits a barrier, then the barrier will explode.

There are nine levels of play. As the level is increased, the enemy tank starts to move faster. Also, the enemy tank is more likely to dodge your missiles.

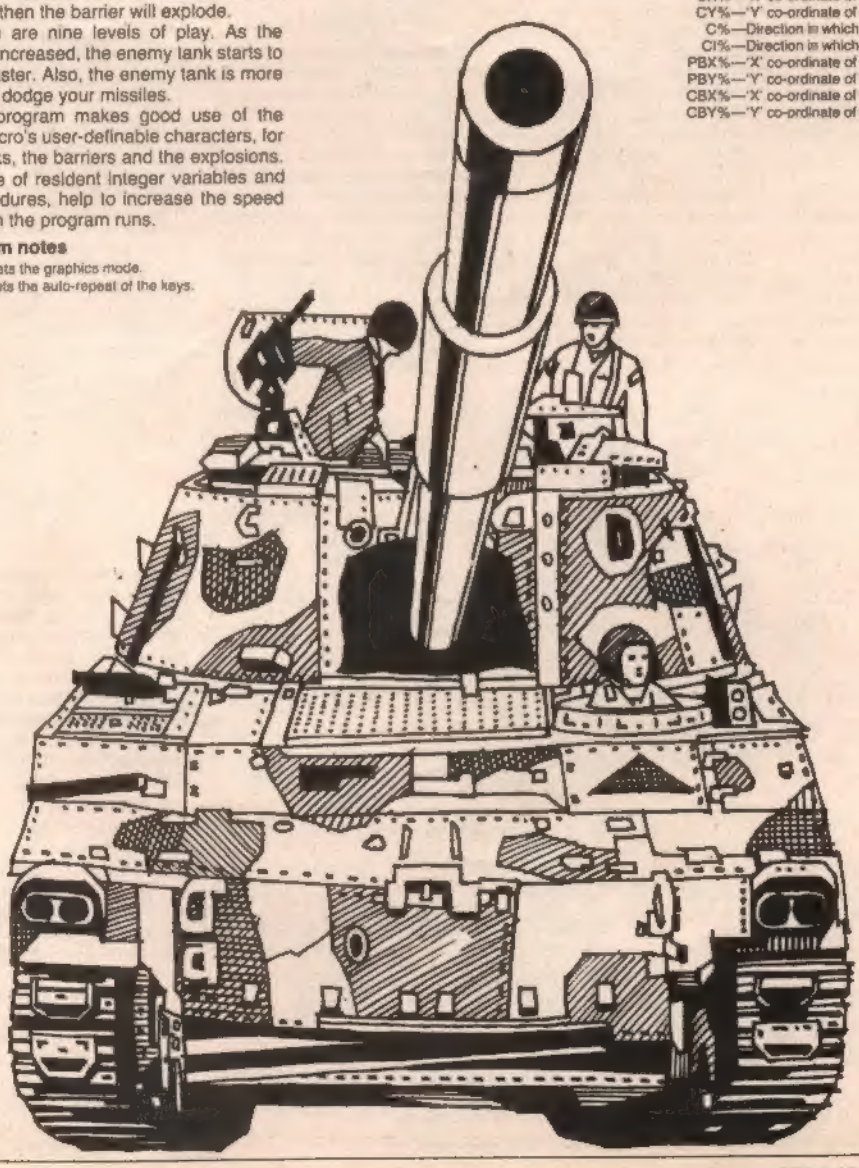
The program makes good use of the BBC Micro's user-definable characters, for the tanks, the barriers and the explosions. The use of resident integer variables and PROCedures, help to increase the speed at which the program runs.

Program notes

Line 10 sets the graphics mode.
Line 20 sets the auto-repeat of the keys.
Lines 40 to 130 set up the instructions of the game and set the level of play.
Line 150 clears the screen.
Lines 170 to 290 set up the variables and define the characters.
Lines 300 to 380 set up the screen for battle.
Lines 390 to 1130 are the loops and procedures involved in the game.
Lines 1140 to 1160 inform the player whether he or the enemy has won.
Lines 1170 to 1200 invite the player to play again.
Line 1210 clears the screen and displays the message "BYE".
Lines 1220 to 1270 create the explosion when either tank is hit.
Line 1280 sets the auto-repeat of the keys back to normal.

Main variables

LLL%—Level of play.
PX%—'X' co-ordinate of player's tank.
PY%—'Y' co-ordinate of player's tank.
CX%—'X' co-ordinate of enemy tank.
CY%—'Y' co-ordinate of enemy tank.
C%—Direction in which the player's tank is pointing.
CI%—Direction in which the enemy tank is pointing.
PBX%—'X' co-ordinate of player's missile.
PBY%—'Y' co-ordinate of player's missile.
CBX%—'X' co-ordinate of enemy missile.
CBY%—'Y' co-ordinate of enemy missile.



```
10 MODE 1
20*FX11,10
30ON ERROR GOTO 1280
40 PRINT"            TANK BATTLE"
50 PRINT"            -----------"
60PRINT''''"KEYS:"
70PRINT'"      E - To move tank up"
80PRINT'"      D - To move tank down"
90PRINT'"      F - To move tank left"
100PRINT'"     G - To move tank right"
110PRINT'"     H - To fire a missile"
120 INPUT''''"Type level of play.""""1 is easy,
9 is  very hard.""""The number should be in the
range of 1-9",LLL%
130 CLS:PRINT''''''''''' G E T
R E A D Y !":FORX=1 TO 10:SOUND 1,-15
,100,5:SOUND 1,0,100,5:NEXT
140 IF LLL%<1 OR LLL%>9 THEN RUN
150 LLL%=10-LLL%
160 CLS
180 BB%=0
190 VDU 23,224,24,24,219,219,255,255,219,219
200 VDU 23,225,63,63,12,255,255,12,63,63
210 VDU 23,226,219,219,255,255,219,219,24,24
220 VDU 23,227,252,252,48,255,255,48,252,252
230 VDU 23,228,60,126,255,255,255,255,126,60
240 VDU 23,229,0,0,0,24,24,0,0,0
250 VDU 23,230,0,0,36,0,0,36,0,0
260 VDU23,231,0,65,0,0,0,0,65,0
270 VDU23,232,129,0,0,0,0,0,0,129
280 VDU 23,233,0,0,0,0,0,0,0,0
290 PX%=20:PY%=12:CX%=37:CY%=30:C%=227:F%=0:
PBX%=-1:PBY%=-1:C1%=0:F1%=0:CEX%=0
:CEY%=0:PEX%=0:PEY%=0:PEF%=0:CEF%=0:CEC%=0:CEF%=0
300 VDU 19,0,1,0,0,0,19,1,0,0,0,0
310 COLOUR 2
320 PRINT TAB(PX%,PY%):CHR$(227)
330 COLOUR 1
340 PRINT TAB(CX%,CY%):CHR$(225)
350 COLOUR 3
360 FOR X=0 TO 40
370 PRINT TAB(RND(34)+2,RND(26)+2):CHR$(228)
380 NEXT
390 A$=INKEY$(0):*FX 15,0
400 TX%=PX%:TY%=PY%
410 IF A$="E"THEN PY%=PY%-1:C%=224:IF PY%<2
THEN PY%=30
420 IF A$="F"THEN PX%=PX%-1:C%=225:IF PX%<0
THEN PX%=38
430 IF A$="G"THEN PX%=PX%+1:C%=227:IF PX%>38
THEN PX%=0
440 IF A$="D"THEN PY%=PY%+1:C%=226:IF PY%>30
THEN PY%=2
450 IF PX%=CX% AND PY%>CY% AND F1%=0 THEN C1%=
226:PROCSHOOT
460 IF PX%=CX% AND PY%<CY% AND F1%=0 THEN C1%=
224:PROCSHOOT
470 IF PY%=CY% AND PX%<CX% AND F1%=0 THEN C1%=
225:PROCSHOOT
480 IF PY%=CY% AND PX%>CX% AND F1%=0 THEN C1%=
227:PROCSHOOT
490 IF F1%=1 THEN PROCSHOOT
500 IF CEF%=1 THEN PROCEXPL
510 IF PEF%=1 THEN PROCEXPLP
520 IF A$="H"AND F%=0 THEN 580
530 COLOUR 2
540 IF TX%=PX% AND TY%=PY% THEN 570
550 PRINT TAB(TX%,TY%);" "
560 PRINT TAB(PX%,PY%):CHR$(C%)
570 IF F%=0 THEN 740 ELSE 640
580 IF C%=224 THEN PBX%=PX%:PBY%=PY%-1:BMX%=0:
BMY%=-1
590 IF C%=225 THEN PBX%=PX%-1:PBY%=PY%:BMX%=-1
:BMY%=0
600 IF C%=226 THEN PBX%=PX%:PBY%=PY%+1:BMX%=0:
BMY%=1
610 IF C%=227 THEN PBX%=PX%+1:PBY%=PY%:BMX%=1:
BMY%=0
620 F%=1
630 SOUND 0,-15,6,10
640 PBY%=PBY%+BMY%
650 PBX%=PBX%+BMX%
660 IF PBY%<2 OR PBY%>30 OR PBX%<0 OR PBX%>38
THEN F%=0:PRINT TAB(PBX%-BMX%,PBY%-BMY%);" ":PBX%
=-1:PBY%=-1:GOTO 740
670 IF ?(HIMEM+PBY%*640+PBX%*16+4)=255
THEN F%=0:GOTO 720
680 IF PBX%=CX% AND PBY%=CY% THEN
PROCEXPLODE:GOTO 1160
690 PRINT TAB(PBX%-BMX%,PBY%-BMY%);" "
700 PRINT TAB(PBX%,PBY%);CHR$(229)
710 GOTO 740
720 PRINTTAB(PBX%-BMX%,PBY%-BMY%);" ":PEX%=PBX%:
PEY%=PBY%:PEC%=229:PEF%=1:GOTO 740
730 DEFPROCEXPLP:COLOUR3:PRINTTAB(PEX%,PEY%);
CHR$(PEC%):PEC%=PEC%+1:IF PEC%=23
4 THEN PEF%=0:ENDPROC
740 IF BB%<LLL%*2 THEN BB%=BB%+1 ELSE BB%=1
750 IF BB%<>1 THEN 390
760 OCX%=CX%:OCY%=CY%
770 IF F%=1 AND PBX%=CX% AND INT(RND(LLL%)+.999)
=1THEN C1%=CX%+1:C1%=227:GOTO 850
780 IF F%=1 ANDPBY%=CY% AND INT(RND(LLL%)+.9999)
=1 THEN CY%=CY%+1:C1%=226:GOTO 850
790 IF F%=1 AND (PBX%=CX%+1 OR PBX%=CX%-1) THEN
390
800 IF F%=1 AND (PBY%=CY%+1 OR PBY%=CY%-1) THEN
390
810 IF PX%>CX% THEN CX%=CX%+1:C1%=227:GOTO 850
820 IF PX%<CX% THEN CX%=CX%-1:C1%=225:GOTO 850
830 IF PY%>CY% THEN CY%=CY%+1:C1%=226:GOTO 850
840 IF PY%<CY% THEN CY%=CY%-1:C1%=224:GOTO 850
850 IF CX%<0 THEN CX%=38
860 IF CX%>38 THEN CX%=0
870 IF CY%<2 THEN CY%=30
880 IF CY%>30 THEN CY%=2
890 COLOUR 1
900 IF OCX%=CX% AND OCY%=CY%THEN930
910 PRINTTAB(OCX%,OCY%);" "
920 PRINTTAB(CX%,CY%):CHR$(C1%)
930 GOTO 390
940 DEFPROCSHOOT
950 IF F1%=1 THEN 1030
960 COLOUR1:PRINT TAB(CX%,CY%):CHR$(C1%)
970 IF C1%=224 THEN CBX%=C1%:CBY%=CY%-1:CMX%=0:
CMY%=-1
980 IF C1%=225 THEN CBX%=C1%-1:CBY%=CY%:CMX%=-1
:CMY%=0
990 IF C1%=226 THEN CBX%=CX%:CBY%=CY%+1:CMX%=0:
CMY%=1
1000 IF C1%=227 THEN CBX%=CX%+1:CBY%=CY%:CMX%=1
:CMY%=0
1010 F1%=1
1020 SOUND 0,-15,5,10
1030 CBY%=CBY%+CMY%
1040 CBX%=CBX%+CMX%
1050 IF CBY%<2 OR CBY%>30 OR CBX%<0 OR CBX%>38
THEN F1%=0:PRINT TAB(CBX%-CMX%,C
BY%-CMY%);" ":ENDPROC
1060 IF ?(HIMEM+CBY%*640+CBX%*16+4)=255 THEN
F1%=0:PRINT TAB(CBX%-CMX%,CBY%-CMY
%);" ":GOTO1110
1070 IF CBX%=PX% AND CBY%=PY%THEN PROCEXPLODE:
GOTO1140
1080  PRINT TAB(CBX%-CMX%,CBY%-CMY%);" "
1090 PRINT TAB(CBX%,CBY%):CHR$(229)
1100 ENDPROC
1110 F1%=0:CEX%=CBX%:CEY%=CBY%:CEC%=229:CEF%=1:
ENDPROC
1120 DEFPROCEXPL:COLOUR2:PRINT TAB(CEX%,CEY%);
CHR$(CEC%):CEC%=CEC%+1:IF CEC%=23 4 THEN CEF%=0
1130 ENDPROC
1140 VDU20:CLS:PRINT''''"  I WIN, YOU ARE DEAD"
1150 GOTO 1170
1160 VDU20:CLS:PRINT''''"YOU WIN"
1170 *FX 15,0
1180 INPUT''''''"Another game ",A$
1190 IF A$="YES" OR A$="yes" THEN RUN
1200 IF A$<>"NO" THEN 1180
1210 CLS:PRINT"BYE!":GOTO 1280
1220 DEFPROCEXPLODE
1230 FOR N=1TO 20
1240 FOR W=1 TO100:NEXT
1250 VDU 19,N,0,0,0,0,19,N-1,7,0,0,0,0
1260 VDU 19,1,0,0,0,0,19,2,2,0,0,0,19,3,7,0,0,0
1270 NEXT:ENDPROC
1280 *FX 11,50
1290 END
```

Tread Softly, pioneer

Gail Counsell tries to untangle the legal jungle created by micro technology

Gail Counsell

How the law affects computer programs is a thorny subject just at the moment.

Many headaches are being caused by uncertaintines in the way software fits into the existing legal structure.

Everyone agrees programs should receive some sort of protection from unfair copying, but no-one seems sure how far they want it to go. And a lot of non-programmers — book and film authors and board-game inventors, for example — are very concerned that they should be properly protected *against* computer games.

Copyright, trade marks, passing-off and contract are just some of the areas of the law which affect software. But their exact influence is very difficult to assess. Computers have developed so quickly that the law has not really caught up. Trying to guess where the lines will be drawn is what is causing all the problems.

Probably the most talked-about aspect of software protection is copyright. One reason for this interest is that copyright law offers a very wide-ranging protection. If a computer program is copyright (and, though this has not yet been conclusively decided, most people assume it will be) then it is automatically protected against a number of unauthorised acts. The most important of these is the making of copies.

Copyright protection would extend to cover both direct copies of the tape itself and copies made using all or part of the program listing. It would also prevent translations of the program — for example from Basic to Forth, adaptations taking the basis of the program and changing some of the surrounding element and even dramatisations — for instance turning a game program into a play or novel. This is because you cannot 'copy' a program even into a different form. So you probably should not make a three-dimensional board-game copy of someone else's computer game.

This also all applies in reverse. It would probably be a breach of copyright to take an existing board game and turn it into a computer game. And, while we are on the subject, it may also be a breach of trade mark law if the name of the game has been registered and you reproduce it without permission.

Unlike copyright, trade marks have to be applied for. They are not automatically granted — you have to fulfil certain criteria. The trade mark has to be in respect of certain types of goods — games are one sort — and the words used have to be *distinctive*. So they can't be everyday words like 'football' or 'chess' (on their own, at any rate).

The other danger in converting a game in this fashion is that its original author will 'claim it is a case of 'passing off'. This is a legal rule which says you must not mislead people — even unintentionally — into thinking that your goods are actually someone else's.

You must not 'pass off" your computer game as someone else's board game. It does not matter that one is a computer game and the other a board game.

Similar problems arise if you want to use a character from a film or play in your game program. The names of characters are not copyright (though, be careful — they may be protected by trade marks) but the visual presentation of them may well be — Mr Spock's ears for example! When such famous characters are used in a game by a reputable software house, permission is always obtained first. This is called a 'licence' and usually gives the company concerned sole rights to a particular fictional individual. Atari, for example, has recently signed a licensing agreement with Walt Disney to use all its characters. In a similar way, Melbourne House agreed with the Tolkien Estate to use the characters from The Hobbit.

A game based on a novel or film may be a breach of copyright. The plot by itself is not copyright, but once you add in characters, incidents and dialogue it soon becomes copyright and 'borrowing' from it will probably be a breach. The line drawn is a very fine one because, to some extent, it depends on the *degree* to which you use these elements.

WARNING: ALL RIGHTS OF THE PRODUCER AND THE OWNER OF THE WORK REPRODUCED RESERVED. UNAUTHORIZED COPYING, HIRING, LENDING, PUBLIC PERFORMANCE, RADIO OR TV BROADCASTING OR DIFFUSION OF THIS CARTRIDGE PROHIBITED

© THORN EMI Video Programmes Ltd 1982

Another area in which copyright may be important is that of compilers and assemblers. These convert from Basic and hexadecimal addresses, respectively, to varieties of object code. Object code is very like machine-code. Compilers are particularly useful. Anyone who can write a game in Basic can compile it to object-code producing the kind of fast arcade action not possible with Basic.

Some companies which sell compilers have been demanding a royalty payment — a cut, if you like — on each cassette sold where the compiler has been used to write the program. In addition to adding to the cost of cassette software, the logic of such a royalty payment is rather doubtful. It is presumably based on the argument that the compiler is 'translating' the program.

Under copyright law the authorised translator of a copyright work gets copyright in the *translation*. For the translation to be copyright, however, it has to be "an original piece of work produced by skill or labour". Probably, a court, if asked, would say that a purely mechanical process, like that of the compiler, wouldn't count. Rather, the compiler would be like the artist's brush — a tool rather than an originator. If the product of the compiler is *not* copyright then why should a royalty be charged? The manufacturer who sells the artist the brush does not claim a royalty on every picture!

There are two other 'hot' legal topics at the moment.

Take lending libraries. These are a recent development as far as software is concerned. They operate in much the same way as book, record and video libraries. In return for payment of a membership subscription plus a hiring fee they loan out cassettes for short periods.

Inevitably, some of those who borrow cassettes do so to make copies of them — despite the fact there is often a rule of membership against this. Of course, this is almost certainly a breach of copyright, as

David Paterson, a founding partner of Silversoft.

well as of the membership rules. (The only thing which prevents this being definitely the case is the lack of a court decision conclusively stating that programs are copyright.)

To software houses these libraries represent a threat to sales and some of them — Silversoft for example — are starting ■ take an agressive stand. After all, it is argued that, as well as making it easier for people to make illicit copies they also discourage purchases — why buy when you can rent more cheaply. The libraries though contend that they actually encourage sales. Not only do the libraries themselves represent significant bulk buyers of cassettes but many — Sinclair Owners Software Library for example — encourage their members to buy programs they have hired. To the extent that they stimulate interest in computer games generally, ■ can be said they help to build up a market.

This is the approach taken by Commodore, who, unlike other software houses, do not include a prohibition against lending or

Jellymonsters — offending Atari.

hiring on the outside of their cassettes. Other companies have not yet made up their minds — Thorn/EMI and Atari for instance, both say they are urgently reviewing what position they should take towards these libraries.

Their decision is not made any the easier by the fact there have not yet been any cases on lending and hiring software. This means the exact legal status of the libraries is uncertain.

The situation is, however, similar to that of record libraries. This parallel is underlined by the fact that some of the companies involved ■ record manufacture are also engaged in producing computer programs. Thorn/EMI for example. And there have been cases on the legality of record lending libraries.

Lending and hiring without permission is not specifically forbidden under copyright law. So the record companies, trying hard to stop the libraries, attempted to argue that libraries were 'authorising' breaches of copyright. They said when the libraries lent out records they knew (and did not care) that they would be taped and that this was an 'authority' in effect. 'Authorising' a breach of copyright is an offence in itself.

But the courts would have none of it. They said this was stretching the meaning of the word too far.

Then one of the record companies — Thorn/EMI in fact — tried ■ different argument, based not on *copyright* but on *contract*. They managed to stop a dealer from lending out their records because a clause in his dealership agreement said that he couldn't. Though they were successful, the trouble with this argument, as far as they are concerned, is that it does not help them against independent libraries — only against people who have come ■ special supply arrangements with them.

So it seems software libraries are not themselves committing any breaches of copyright. If they have dealership agreements though, they may be committing a breach of contract. Such agreements are not common however. There is one other way the libraries could be said to be committing a breach of contract. This involves the second 'hot topic.'

Many cassettes carry notices on them claiming they are copyright and warning against making copies. Some also say the cassettes must not be lent or hired out.

Such clauses are not strictly necessary from the copyright point of view. ■ this country, ■ any rate, if something is copyright then it is automatically protected — no word 'copyright' or '(c)' is needed. A copyright notice does however draw the buyer's attention to the fact that the program has such protection (if indeed it does). (In America a copyright notice *is* necessary before the material ■ protected.)

But these clauses may have another function. They can be attempts ■ bind contractually the person buying the cassette. Such notices are promises — the seller promises to sell you the program, but only if you promise not to copy or lend it.

While copyright law can probably not be used to restrict lending and hiring, such a contractual 'promise' may work. This is a very complicated legal area and for various reasons the attempt could fail. The clause needs to be clearly visible *before* you buy the cassette, for ■ start. Many of these clauses are inside the packaging and can serve as no more than warning notices.

This is also true for mail order cassettes — the clause would have to be displayed in the advertisement to stand any chance of working.

The big disadvantage of such clauses for software houses is that they do not 'bind third parties.' This means that only the person buying the cassette is stopped

Alec Fry, founder Sinclair Owners' Software Library.

from hiring or lending ■. Someone buying or being given it later on would not be.

One final interesting point concerns so-called 'breaker' programs. These are used to break into a machine-code program designed to auto-run on loading. Whether these are legal or not may depend on whether they have any purpose other than to help people break into copyright programs to copy them. If they have not then it may be that they form some sort of 'authority' to make an illicit copy. If so then those selling them might also be committing ■ breach of copyright.

No one ■ likely to get thrown into gaol merely because he commits a breach of copyright, contract or any of these other matters — breaches of what are called the 'civil' law are not punishable by a stretch ■ the 'pen'! But he can be made to hand over any profits he may have made out of things he has done which he should not have. He may also have to pay damages for any financial loss he may have caused — and that can ■ a very expensive business.

With so many grey areas in the law at the moment as far as software is concerned it may be just as well to err on the side of caution.

● On the letters page of this issue, 7, *Popular Computing Weekly* replies to complaints against lending libraries from Bug Byte Software and Silversoft. PSC is offering to help bring software companies together ■ take some joint action.

Adventure trails

***Mike Grace** ruminates on a selection of Vic Adventure games.*

Computer games fall into several distinct categories: Invaders type, Educational, Traditional (such as chess), and Adventure. Of course there are subdivisions within those categories, and there are some which do not fit into any of the above, but to my mind most software can be classified within one of these major divisions.

Adventure games form a particular genre and have a mystique all their own. (see my review of the Commodore range in *Popular Computing Weekly* Volume 1:25). It is this type of game that I am reviewing in this article. However not all Adventure-type software is of the traditional type — sometimes to its advantage.

The first batch of Adventure games I tried was from *Leisure Soft* in Blackpool. These games were in cassette form, with very attractive cardboard sleeves inside cases depicting assorted wizards, demons, swords and the other characters typically found in fantasy stories.

Closer scrutiny reveals the artwork to be a trifle amateurish. It always seems a shame that a little more effort and time spent in considering packaging would go a long way towards selling the final product. In software the customer still seems to have to put up with a low standard from so many sources.

Having experienced the Scott Adams series, produced by Commodore, I was a little surprised by these three offerings. The format was essentially the same, (instructions on the screen answered by appropriate text), but the general standard

Mike Grace, our cheerful reviewer

was much lower. Silly spelling errors crept in occasionally and many of the messages seemed less helpful to my essentially novice status.

More seriously, some of the directions were incorrect so that if I went north to one location I found that by typing south again I would not return to the correct place but to somewhere else. To be fair this only happened in one adventure, but in another I never succeeded in leaving the first location as whatever I typed resulted in my being left in the same place. Although this may be due to some incredible stupidity on my part, after about 15 minutes of frustrated attempts I gave up, assuming it to be a bug in the program.

There were three different adventures to discover. *Time Machine* was one, where I was promised (in the sketchy synopsis written on the accompanying instruction leaflet) that I would have to search for all three glass prisms and insert them into the *Time Machine*. This would have unpredictable results.

To start with I was stranded on a foggy moor looking for the eccentric Dr Potter's old house late at night. Basic good stuff of which adventures are made — but alas this was the program I could not solve at all as whichever direction I typed resulted in the same message "you are on a foggy moor" flashing back onto the screen. If this *is* a bug perhaps I can explore *Time* more satisfactorily later.

The other two adventures are part of a triology which starts with the *Golden Baton* adventure and follows with the *Arrow of Death* Parts I and II. It concerns Tolkienesque characters in the ancient Kingdom of Elves. *Golden Baton* was the better of the two as I managed to get quite a long way into the adventure and the continuity was good. *Arrow of Death* (Part I) annoyed me by failing to adhere to a proper map. I gave up at an early stage.

The cassettes cost £9.95 plus 50p postage, so are much cheaper than Commodore's range, but the amateurish style (both in presentation of the packaging and of screen layouts in the messages themselves) detracts greatly and I would prefer to pay more for a better game. However, if you want to struggle with an adventure for

a lot less money then try *The Golden Baton* first, and hopefully Leisure Soft will tidy up the other two to make them easier.

One of the problems with Adventure games is that they are difficult to solve, very time-consuming, and at times extremely frustrating, (which is why they are so appealing to some people of course). But younger children and less enthusiastic adults might like a simpler alternative to the traditional adventure which is easier to solve. Impact Software has produced just

OPEN FORUM

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published.

Editor

on Dragon

The Dragon's Microsoft editor is excellent, but there are two extra commands which the manual doesn't mention, these are:

'A' Refills the edit buffer with the original program line, (this is useful when editing has become confused).

'Q' Aborts the editor, makes no changes to program line and gives OK prompt.

Yet another major omission from the Dragon manual is the *Dn Error* message. This stands for 'Device Number Error' and occurs if the number in an *Open/Close/Eof* command is not 0, −1, or −2. Try *Print Eof*(−7) for example.

Peter Chase's article on repeating *Inkeys* is very good (issue 36) but his function which needs a whole subroutine may be reproduced in one line as:

```
10 DEF FNA(A)=ABS(PEEK(135)*((PEEK(65280)
OR 128)<>255))
```

and may be used by A=FNA(0) where A will equal the Ascii code of any key being pressed. A will equal zero if no key is being pressed.

It can be annoying when writing programs which require Yes/No answers to have to check for both upper and lower case letters. Memory location 329 is the lower case on/off switch. *Poke* 329,0 turns lower case on; *Poke* 329,255 turns it off.

Anybody writing machine code programs should find the following notes especially useful:

195 & 196	Line number of program line currently being executed
136 & 137	PRINT@ position in memory, ie if PRINT position were at 23, PEEK(137)+256 *PEEK(136) would give 1047.
337 to 345	Keyboard check.
426 to 433	Name of file being searched for.
434 to 441	Name of file being loaded.
274 & 275	Value of TIMER function
For the 'PLAY' command:	
226	TEMPO
225	NOTE DURATION
222	CONTROLS OCTAVE

Locations 346 to 349 contain the values of *Joystick*(0) to *Joystick*(3) respectively. These may be updated by calling the Rom routine which starts at location 48466. In Basic this would be *Exec*(48466).

Locations 65494 and 65495 are used to alter the CPU speed. *Poke* 65495,255 will double the speed to 1.8 MHz. *Poke* 65494,255 returns it to its normal speed. The Dragon is not designed to run at 1.8 MHz and so I don't really recommend its frequent use in programs. Other useful Rom routines that may be called are:

EXEC(41194) which will flash the cursor until any key is pressed

EXEC(46069) which will restart BASIC giving the usual (C) 1982 DRAGON DATA LTD message.

Bit 3 of location 65313 controls the cassette relay, 1 is on, 0 is off. Bit 0 of location 65312 is the cassette data input.

Finally, I give below two machine code routines that may be of general use, the first scrolls the Hi-Res screen down by one pixel in *Pmodes* 3 and 4, the second can be used to either invert the whole text screen to white on black or clear the text screen to an Ascii character. The routines can be located anywhere in Ram as they contain no absolute jumps etc.

```
10 CLEAR 200,31999
20 DATA 142,23,223,16,142,23,255,166,137,
   0,0,167,169,0,0,48,63,48,31,140,255,255,46,
   239,57
30 FOR I=1 TO 25
40 READ A : POKE 31999+I,A
50 NEXT I
```

call by EXEC(32000)

Screen invert/clear;

```
10 CLEAR 200,31999
20 DATA 142,0,0,166,137,
   4,0,132,191,167,137,4,0,48,1,140,2,0,37,239,57
30 B=32050 : FOR I=0 TO 20 : READ A
40 POKE B+I,A
50 NEXT I
```

call by EXEC(B)

To change to screen clear, *Poke* B+7,134 and *Poke* B+8, Ascii of required character. These two routines can be used separately or together.

Editor
by Brian Cadge

Colour Strips

on Spectrum

This program draws, in the right-hand bottom corner of the screen, the Spectrum colour stripes. It is numbered in such a way as to be easily *Merged* with other programs to provide an extra splash of colour to a litle page.

The program uses the *Inverse* function by making the yellow and blue stripes from ink colour which has been inverted to paper.

As it stands the main paper colour of the page is defined by the variable 'P' but this can, obviously, be altered to suit requirements. It may be necessary to change or even delete line 9810 in these circumstances.

```
9800 REM © Steve Mercer 1982
9805 LET p=0
9810 BORDER 7: PAPER p: CLS : IN
K 2
9815 LET x=64: LET y=64
9820 FOR n=191 TO 255
9825 PLOT n,0: DRAW x,y
9830 LET x=x-1: LET y=y-1
9835 NEXT n
9840 LET x=50: LET y=50
9845 INVERSE 1
9850 FOR n=205 TO 255
9855 PLOT PAPER 6;n,0: DRAW PAPE
R 6;x,y
9860 LET x=x-1: LET y=y-1
9865 NEXT n: INVERSE 0
9870 INK 4: LET x=38: LET y=38
9875 FOR n=217 TO 255
9880 PLOT n,0: DRAW x,y
9885 LET x=x-1: LET y=y-1
9890 NEXT n
9895 INVERSE 1: LET x=26: LET y=
26
9900 FOR n=229 TO 255
9905 PLOT PAPER 1;n,0: DRAW PAPE
R 1;x,y
9910 LET x=x-1: LET y=y-1
9915 NEXT n: INVERSE 0
9920 INK p: LET x=14: LET y=14
9925 FOR n=241 TO 255
9930 PLOT n,0: DRAW x,y
9935 LET x=x-1: LET y=y-1
9940 NEXT n
9945 STOP
```

```
string array       a$(2,4,6,)
string array       b$(20,10,)
variable array     a(5,3,)
variable           ave=17
variable           xt1t1t=10
variable           pi=3.1415927
variable           zzz=25271
variable           zz=196
for-next count     h=  3
string             z$= ""
END OF DUMP
```

Colour Strips
by Stephen Mercer

Vardump

on Spectrum

Last week we inadvertently left out this program by D S Laurence.

```
9980 REM VarDump
9981 LET zzz=PEEK 23627+256*PEEK
 23628
9982 LET zz=PEEK zzz
9983 IF zz=128 THEN PRINT "END O
F DUMP": STOP
9984 IF zz>=96 AND zz<=127 THEN
LET zzz=zzz+6: PRINT "variable",
CHR$ zz;"= ";VAL (CHR$ zz): GO
TO 9982
9985 IF zz>=160 AND zz<=191 THEN
 PRINT "variable",: LET z$=CHR$
(zz-64): GO TO 9990
9986 IF zz>=128 AND zz<=159 THEN
 PRINT "variable array",CHR$ (zz
-32);"(";: FOR h=1 TO PEEK (zzz+
3): PRINT PEEK (zzz+2+2*h)+256*P
EEK (zzz+2*h+3);",";: NEXT h: PR
INT ")": LET zzz=zzz+3+PEEK (zzz
+1)+256*PEEK (zzz+2): GO TO 9982
9987 IF zz>=224 AND zz<=255 THEN
 LET zzz=zzz+19: PRINT "for-nex
t count",CHR$ (zz-128);"= ";VAL
(CHR$ (zz-128)): GO TO 9982
9988 IF zz>=64 AND zz<=95 THEN L
ET zzz=zzz+3+PEEK (zzz+1)+256*PE
EK (zzz+2): PRINT "string",CHR$
 (zz+32);"$"+"= """;VAL$ (CHR$ (
zz+32)+"$");"""": GO TO 9982
9989 IF zz>=192 AND zz<=223 THEN
 PRINT "string array",CHR$ (zz-9
6);"$(";: FOR h=1 TO PEEK (zzz+3
): PRINT PEEK (zzz+2+2*h);",";:
NEXT h: PRINT ")": LET zzz=zzz+3
+PEEK (zzz+1)+256*PEEK (zzz+2):
GO TO 9982
9990 LET zzz=zzz+1: IF PEEK zzz<
=128 THEN LET z$=z$+CHR$ (PEEK z
zz): GO TO 9990
9991 LET z$=z$+CHR$ (PEEK zzz-12
8): PRINT z$;"=";VAL (VAL$ ("z$"
)): LET z$="": LET zzz=zzz+6: GO
 TO 9982
```

Vardump
by D S Laurence

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Editor

on Dragon

The Dragon's Microsoft editor is excellent, but there are two extra commands which the manual doesn't mention, these are:

'A' Refills the edit buffer with the original program line, (this is useful when editing has become confused).

'Q' Aborts the editor, makes no changes to program line and gives OK prompt.

Yet another major omission from the Dragon manual is the *Dn Error* message. This stands for 'Device Number Error' and occurs if the number in an *Open/Close/Eof* command is not 0, −1, or −2. Try *Print Eof*(−7) for example.

Peter Chase's article on repeating *Inkeys* is very good (issue 36) but his function which needs ■ whole subroutine may be reproduced in one line as:

```
10 DEF FNA(A)=ABS(PEEK(135)*((PEEK(65280)
OR 128)<>255))
```

and may be used by A=FNA(0) where A will equal the Ascii code of any key being pressed. A will equal zero if no key is being pressed.

It can be annoying when writing programs which require Yes/No answers to have to check for both upper and lower case letters. Memory location 329 is the lower case on/off switch. *Poke* 329,0 turns lower case on; *Poke* 329,255 turns it off.

Anybody writing machine code programs should find the following notes especially useful:

195 & 196	Line number of program line currently being executed
136 & 137	PRINT@ position in memory, ie if PRINT position were at 23, PEEK(137)+256 *PEEK(136) would give 1047.
337 to 345	Keyboard check.
426 to 433	Name of file being searched for.
434 to 441	Name of file being loaded.
274 & 275	Value of TIMER function
For the 'PLAY' command:	
226	TEMPO
225	NOTE DURATION
222	CONTROLS OCTAVE

Locations 346 to 349 contain the values of *Joystick*(0) to *Joystick*(3) respectively. These may be updated by calling the Rom routine which starts at location 48466. In Basic this would be *Exec*(48466).

Locations 65494 and 65495 are used to alter the CPU speed. *Poke* 65495,255 will double the speed to 1.8 MHz, *Poke* 65494,255 returns it to its normal speed. The Dragon is not designed to run at 1.8 MHz and so I don't really recommend its frequent use in programs. Other useful Rom routines that may be called are:

EXEC(41194) which will flash the cursor until any key is pressed

EXEC(46989) which will restart BASIC giving the usual (C) 1982 DRAGON DATA LTD message.

Bit 3 of location 65313 controls the cassette relay, 1 is on, 0 is off. Bit 0 of location 65312 is the cassette data input.

Finally, I give below two machine code routines that may be of general use, the first scrolls the Hi-Res screen down by one pixel in *Pmodes* 3 and 4, the second can be used to either invert the whole text screen to white on black or clear the text screen to an Ascii character. The routines can be located anywhere in Ram as they contain no absolute jumps etc.

```
10 CLEAR 200,31999
20 DATA 142,23,223,16,142,23,255,166,137,
   0,0,167,169,0,0,48,63,48,31,140,255,255,46,
   239,57
30 FOR I=1 TO 25
40 READ A : POKE 31999+I,A
50 NEXT I
```

call by EXEC(32000)

Screen invert/clear:

```
10 CLEAR 200,31999
20 DATA 142,0,0,166,137,
   4,0,132,191,167,137,4,0,48,1,140,2,0,37,239,57
30 B=32050 : FOR I=0 TO 20 : READ A
40 POKE B+I,A
50 NEXT I
```

call by EXEC(B)

To change to screen clear, *Poke* B+7,134 and *Poke* B+8, Ascii of required character. These two routines can be used separately or together.

Editor
by Brian Cadge

Colour Strips

on Spectrum

This program draws, in the right-hand bottom corner of the screen, the Spectrum colour stripes. It is numbered in such a way as to be easily *Merged* with other programs to provide an extra splash of colour to a title page.

The program uses the *Inverse* function by making the yellow and blue stripes from ink colour which has been inverted to paper.

As it stands the main paper colour of the page is defined by the variable 'P' but this can, obviously, be altered to suit requirements. It may be necessary ■ change or even delete line 9810 in these circumstances.

```
9800 REM © Steve Mercer 1982
9805 LET p=0
9810 BORDER 7: PAPER p: CLS : IN
K 2
9815 LET x=64: LET y=64
9820 FOR n=191 TO 255
9825 PLOT n,0: DRAW x,y
9830 LET x=x-1: LET y=y-1
9835 NEXT n
9840 LET x=50: LET y=50
9845 INVERSE 1
9850 FOR n=205 TO 255
9855 PLOT PAPER 6;n,0: DRAW PAPE
R 6;x,y
9860 LET x=x-1: LET y=y-1
9865 NEXT n: INVERSE 0
9870 INK 4: LET x=38: LET y=38
9875 FOR n=217 TO 255
9880 PLOT n,0: DRAW x,y
9885 LET x=x-1: LET y=y-1
9890 NEXT n
9895 INVERSE 1: LET x=26: LET y=
26
9900 FOR n=229 TO 255
9905 PLOT PAPER 1;n,0: DRAW PAPE
R 1;x,y
9910 LET x=x-1: LET y=y-1
9915 NEXT n: INVERSE 0
9920 INK p: LET x=14: LET y=14
9925 FOR n=241 TO 255
9930 PLOT n,0: DRAW x,y
9935 LET x=x-1: LET y=y-1
9940 NEXT n
9945 STOP
```

```
string array        a$(5,4,6,)
string array        b$(20,10,)
variable array      a(5,3,)
variable            $v$=1
variable            xlimit=10
variable            pi=3.1415927
variable            zzz=25271
variable            zz=186
for-next count      n=  3
string              z$= ""
END OF DUMP
```

Colour Strips
by Stephen Mercer

Vardump

on Spectrum

Last week we inadvertently left out this program by D S Laurence.

```
9960 REM vardump
9961 LET zzz=PEEK 23627+256*PEEK
 23628
9962 LET zz=PEEK zzz
9963 IF zz=128 THEN PRINT "END O
F DUMP": STOP
9964 IF zz>=96 AND zz<=127 THEN
LET zzz=zzz+6: PRINT "variable",
CHR$ zz;"=";VAL (CHR$ zz): GO
TO 9962
9965 IF zz>=160 AND zz<=191 THEN
 PRINT "variable": LET z$=CHR$
(zz-64): GO TO 9990
9966 IF zz>=128 AND zz<=159 THEN
 PRINT "variable array",CHR$ (zz
-32);"(";: FOR h=1 TO PEEK (zzz+
3): PRINT PEEK (zzz+2+2*h)+256*P
EEK (zzz+2*h+3);",";: NEXT h: PR
INT ")": LET zzz=zzz+3+PEEK (zzz
+1)+256*PEEK (zzz+2): GO TO 9962
9967 IF zz>=224 AND zz<=255 THEN
 LET zzz=zzz+19: PRINT "for-nex
t count",CHR$ (zz-128);"=";VAL
(CHR$ (zz-128)): GO TO 9962
9968 IF zz>=64 AND zz<=95 THEN L
ET zzz=zzz+3+PEEK (zzz+1)+256*PE
EK (zzz+2): PRINT "string",CHR$
 (zz+32);"$";"=";VAL$ (CHR$ (
zz+32)+"$"),"": GO TO 9962
9969 IF zz>=192 AND zz<=223 THEN
 PRINT "string array",CHR$ (zz-9
6);"$(";: FOR h=1 TO PEEK (zzz+3
): PRINT PEEK (zzz+2+2*h)-",";:
NEXT h: PRINT ")": LET zzz=zzz+3
+PEEK (zzz+1)+256*PEEK (zzz+2):
GO TO 9962
9990 LET zzz=zzz+1: IF PEEK zzz<
=128 THEN LET z$=z$+CHR$ (PEEK z
zz): GO TO 9990
9991 LET z$=z$+CHR$ (PEEK zzz-12
8): PRINT z$,"=";VAL (VAL$ ("z$"
)): LET z$="": LET zzz=zzz+6: GO
 TO 9962
```

Vardump
by D S Laurence

FREE!

WHILE STOCKS LAST

dBASE

Relational database/programme generator package worth £385!!

WITH

DOUBLE DENSITY

OSBORNE 1

UNTIL FEBRUARY 16 ONLY AT

£1,375 + VAT

PHONE YOUR ORDER NOW

HURRY! HURRY! HURRY!

4B microcentres

North Bar, Banbury, Oxon. OX16 0TF Telephone (0295) 66555

0295-66555

FOR THE FIRST TIME ANYWHERE IN THE WORLD!

ASTROLOGY

ON YOUR SINCLAIR ZX81 (16K) AND SPECTRUM

USER PROMPTING PROGRAMS: merely key in birth information as requested by the computer — READ OUT (and/or PRINT OUT) what is normally the result of many hours of painstakingly tedious and complex mathematical calculations using tables, ephemera, etc.

Cassette I — ZODIAC I — ONLY £10.00

makes truly AVAILABLE AT YOUR FINGERTIPS
THE SIDEREAL TIME OF BIRTH.
THE ASCENDANT AND MIDHEAVEN in Sign, Degrees, Minutes, and Seconds for EQUAL HOUSE SYSTEM.
THE SIGNS AND POSITIONS OF THE HOUSE CUSPS in Sign, Degrees, and Minutes for the PLACIDEAN SYSTEM.
THE SUN AND MOON POSITIONS in Sign, Degrees, Minutes and Seconds
ALL THE PLANETS POSITIONS in Sign, Degrees and Minutes.
THE LUNAR NODE — THE PART OF FORTUNE — THE VERTEX, AND A HOST OF OTHER BIRTHCHART INFORMATION AT THE TOUCH OF A KEY.

Cassette II — ZODIAC II — ONLY £8.00

GIVES YOU THE ASPECTS

Other programs in course of preparation include: PROGRESSING THE HOROSCOPE; RECTIFICATION OF THE BIRTH TIME, etc.

STELLAR SERVICES

8 FIR TREE VALE, LEEDS LS17 7EY
Tel: (0532) 692770

BUTTERCRAFT SOFTWARE

QUALITY SPECTRUM SOFTWARE

LET AUTO-SONICS PUT EXCITING, COLOURFUL SOUND EFFECTS INTO YOUR PROGRAMS!

AUTOSONIC GIVES YOU

- 26 superb sound effects, including ten arcade style space effects. Telephone, Police Siren, Monster Growl, Helicopter, Outboard, Beeper, Frog, Duck, Pig etc. etc.
- An on screen 'synthesiser' control panel that lets you create thousands of your own unique sounds.
- Every sound you hear can be instantly added to your own program, completely independent of Autosonic. Cassette instructions **£4.99**

GULPMAN — Superb arcade-quality version of ... you know what! First machine code ... Full colour and sound ... 15 mazes ... 9 speeds ... 9 grades ... Hi-score etc. ! An extraordinarily good programme — well worth the price. *PCW Magazine* ! Cassette with full-colour insert **£5.95**

WINGED AVENGERS — 7 Speeds ... Laser Shield ... Mother-ship ... Re-fuelling ... Smart bombs ... Hi-score ... Sound ... Hi-res colour graphics ! One of the best Sinclair games yet. YCN. Only **£4.50**

SCRAMBLE CONDITION RED — Full machine code. Hi-res colour graphics ... Sound ... 8-direction control ... Missiles ... Bombs ... Fuel dumps ... Meteors ... Hi-score ... etc. Super Arcade Action for only **£4.95**

AMPLIFY YOUR SPECTRUM (OR ANY COMPUTER) FOR ONLY £4.99 + 50p p&p

UNISONIC AMPLIFIER AM RADIO

- Use cassette lead to connect to your computer for loud clear amplification of the sound output.
- Unplug lead and it's a neat pocket radio with smart wrist-strap. Uses one PP3 (not supplied).

TRS80 and Video Genie owners: Ask for our list of Guaranteed Quality Software including new for 83 Frogger-Plus only **£4.99**

14 WESTERN AVE., RIDDLESDEN(W), KEIGHLEY, YORKS. ENGLAND

Please Deduct 50p Discount secured this & all subsequent orders

---

SPECTRUM SOFTWARE

IQ TEST..... £5.75

How intelligent are you? 2 separate tests give an accurate assessment of your abilities

THE JOKER..... £5.75

Hundreds of rib tickling puns and jokes coupled with mind blowing graphics. Great for parties!!

Trade enquiries welcome: Orders despatched by return

PRICES INCLUDE POST & VAT. ALL PROGS 16 OR 48K.

Flowchart LTD

PHONE (0933) 650073

DEPT 1
62 HIGH STREET
IRTHLINGBOROUGH
NORTHANTS NN9 5TN

Alien Shoot

on Vic-20

The object of this game is to shoot the alien who flys across the screen before he lands and takes your base. You use the space bar to fire and your score is shown when the game is over. The variables are R: Missile and Q: Alien.

Program notes

7 to 11 Set up screen and put in the base and ground
15 to 100 Get the alien to move and test for firing.
105 to 140 Get the missile to move and make missile sound
150 Checks a hit or not
180 to 204 Make the alien explode and make sounds.
205 to 400 End the game and give you your score.

```
 0 POKE36879,27:PRINT"J"
 1 PRINT"■■■■■ALIEN SHOOT■■"
 2 PRINT"■■■SPACE BAR■=FIRE"
 3 REM **BY MAX ADDIE**
 4 FORI=1TO3000:NEXT
 5 PRINT"J"
 6 REM SET SCREEN
 7 POKE7690,160
 8 POKE8130,65
 9 FORW=8134TO8163:POKEW,160:NEXT
 10 POKE8125,32:POKE8135,102
 11 POKE36879,109
 12 REM SET ALIEN
 13 REM *** *****
 15 Q=7790
 20 POKEQ,88
 30 FORI=1TO10:NEXT
 40 POKEQ,32
 50 Q=Q+1
 52 IFPEEK(Q)=160THEN300
 55 GETA$:IFA$=" "THEN100
 60 GOTO20
 100 POKEQ,88
 103 REM SET LASER
 105 P=8098+11
 106 POKE36878,15
 107 POKE36876,229
 108 FORI=1TO200:NEXT
 109 POKE36876,0
 110 POKER,33
 120 FORJ=1TO10:NEXTJ
 130 POKER,32
 140 R=R-22
 150 IFPEEK(R)<>32THEN180
 160 GOTO110
 180 IFPEEK(R)=160THEN400
 200 POKER,86
 201 POKE36878,15
 202 POKE36877,147
 203 FORI=1TO300:NEXT
 204 POKE36877,0
 205 PRINT"■■■■HIT"
 208 FORI=1TO500:NEXT
 210 SC=SC+5
 220 GOTO5
 300 PRINT"■■■■■■YOU HAVE BEEN"
 310 PRINT"■■■■TAKEN OVER!"
 315 PRINT"■SCORE="SC
 320 FORI=1TO2000:NEXT
 330 PRINT"■■■NEW GAME?(Y,N)"
 340 INPUTA$:IFA$="Y"THENGOTO5
 350 END
 400 GOTO20

READY.
READY.
```

Alien Shoot
by Max Addie

Line Drawing

on BBC Micro

This program is written for a BBC micro Model A and makes use of most aspects of line drawing on the BBC e.g. *Plot, Draw, Move,* and uses Mode 4 for a higher resolution.

The pattern includes a solid circle made out of tiny triangles joined together. The other two parts of the program also make use of the Cos,Sin,Tan functions.

Program notes

10 Selects the mode.
20 Starts the loop for the circular motion
30,40 Draws the pattern
50 Returns the loop.
60 See 20.
70,80,90 Fills in the circle with tiny triangles.
120 Draws first circle.
130,140 Draws second circle
160 This line is not essential, I just put it in to stop the arrow coming up and spoiling the corner pattern

```
 1 REM**SIN,COS,TAN DISPLAY
 2 REM**IAN'S PROGRAM (C)1982
 10 MODE 4
 20 FOR L=0 TO 2*PI STEP 0.07
 30 MOVE 635-200/COS(L)*TAN(L),400+300*SIN(L)*COS
    (L)*TAN(L)
 40 DRAW 635,0
 50 NEXT L
 60 FOR L=0 TO 2*PI STEP 0.04
 70 PLOT 4,635,800
 80 PLOT 4,635+200*SIN(L),800+200*COS(L)
 90 PLOT 85,635+200*SIN(L+0.04),800+200*COS(L+0.04)
 100 NEXT L
 110 FOR L=0 TO 2*PI STEP 0.06
 120 MOVE 0+300*SIN(L),1000+300*COS(L):DRAW 0,1000
 130 MOVE 1270+300*SIN(L),1000+300*COS(L)
 140 DRAW 1270,1000
 150 NEXT L
 160 GOTO 160
```

Line Drawing
by Ian Entwistle

Conversion

on ZX81

This program starts off by asking you which subject you want:
Equivalents
To Convert
Equivalents (British)

Equivalents tells you metric equivalents eg 1 mm = 0.0394 in.

To Convert converts metric to yards feet and inches. You enter the number you want to convert then it works it out and prints it out on the screen.

Equivalents (British) tells you British equivalents. On both equivalents there is an option to copy on a printer.

If you have not got a printer then take out lines 170, 199, 767, 770. Lines 100—199 prints out equivalents. Lines 200—239 prints out choices for conversions, and lines 300—700 works out the conversion and prints the answer on the screen.

```
  9 CLS
  10 PRINT AT 0,7 "MEASURE"
  11 PRINT AT 1,7 "■■■■■■■"
  12 PRINT
  13 PRINT
  20 PRINT "1 EQUIVALENTS (METR
IC)"
  22 PRINT
  24 PRINT "2 TO CONVERT"
  26 PRINT
  28 PRINT "3 EQUIVALENTS (BRIT
ISH)"
  30 PRINT AT 18,17,"ENTER 1,2 O
R 3"
  32 INPUT A$
  34 IF A$="1" THEN GOTO 100
  35 IF A$="2" THEN GOTO 200
  38 IF A$="3" THEN GOTO 700
```

```
 100 CLS
 110 PRINT "METRIC EQUIVALENTS"
 111 PRINT "■■■■■■■■■■■■■■■"
 114 PRINT AT 2,0 "■■■■■■■"
 115 PRINT
 120 PRINT
 130 PRINT "1 MM
0.0394 IN"
 140 PRINT "1 CM = 10 MM
0.393 IN"
 150 PRINT "1 M =100 CM
1.0936 YDS"
 160 PRINT "1 KM =1000 M
0.6214 MILE"
 170 PRINT AT 12,1,"TO COPY PRES
S C"
 180 PRINT AT 13,1,"PRESS N TO G
ET BACK TO MENU"
```

```
 190 INPUT A$
 192 IF A$="N" THEN GOTO 0
 199 IF A$="C" THEN COPY
 200 CLS
 210 PRINT "TO CONVERT"
 220 PRINT "■■■■"
 230 PRINT
 240 PRINT "ENTER "
 250 PRINT "1 MILLIMETRES TO IN
CHES"
 255 PRINT "2 METRES TO FEET"
 260 PRINT "3 METRES TO YARDS"
 270 PRINT "4 KILOMETRES TO MILE
S"
 280 PRINT "5 INCHES TO MILLIMET
RES"
 290 PRINT "6 FEET TO METRES"
 295 PRINT "7 YARDS TO METRES"
 300 PRINT "8 MILES TO KILOMETRE
S"
 310 PRINT
 320 PRINT "NUMBER"
```

Continued on page 18

Continued from page 17

```
239 INPUT A$
240 IF A$="1" THEN GOTO 300
245 IF A$="2" THEN GOTO 320
250 IF A$="3" THEN GOTO 340
255 IF A$="4" THEN GOTO 360
260 IF A$="5" THEN GOTO 380
265 IF A$="6" THEN GOTO 400
270 IF A$="7" THEN GOTO 420
275 IF A$="8" THEN GOTO 440
300 CLS
302 PRINT "MILLIMETRES TO INCHE
"
304 PRINT
306 PRINT "ENTER MILLIMETRES?"
308 INPUT B
310 PRINT AT 4,0,B
312 PRINT AT 4,8,B*0.0394
315 PRINT AT 16,1,"ENTER 0 TO D
O MORE"
316 PRINT AT 17,1;"ENTER M FOR
MENU"
317 INPUT A$
318 IF A$="0" THEN GOTO 300
319 IF A$="M" THEN GOTO 8
320 CLS
321 PRINT "METRES TO FEET"
322 PRINT
323 PRINT "ENTER METRES?"
324 INPUT B
325 PRINT AT 4,0,B
326 PRINT AT 4,8,B*3.2808
327 PRINT AT 16,1,"ENTER ■ TO ■
O MORE"
328 PRINT AT 17,1,"ENTER M FOR
MENU"
329 INPUT A$
330 IF A$="0" THEN GOTO 300
331 IF A$="M" THEN GOTO 8
340 CLS
341 PRINT "METRES TO YARDS"
342 PRINT
343 PRINT "ENTER METRES"
344 INPUT B
345 PRINT AT 4,0,B
346 PRINT AT 4,8,B*1.0936
347 PRINT AT 16,1 "ENTER 0 TO D
O MORE"
348 PRINT AT 17,1;"ENTER M FOR
MENU"
349 INPUT A$
350 IF A$="0" THEN GOTO 300
351 IF A$="M" THEN GOTO 8
360 CLS
361 PRINT "KILOMETRES TO MILES"
362 PRINT
363 PRINT "ENTER KILOMETRES"
364 INPUT B
365 PRINT AT 4,0;B
366 PRINT AT 4,8,B*0.6214
367 PRINT AT 16,1;"ENTER ■ TO D
O MORE"
368 PRINT AT 17,1,"ENTER ■ FOR
MENU"
369 INPUT A$
370 IF A$="0" THEN GOTO 300
371 IF A$="■" THEN GOTO 8
380 CLS
381 PRINT "INCHES TO MILLIMETRE
S"
382 PRINT
383 PRINT "ENTER INCHES?"
384 INPUT B
385 PRINT AT 4,0,B
386 PRINT AT 4,8,B*25.4
387 PRINT AT 16,1,"ENTER 0 TO D
O MORE"
388 PRINT AT 17,1,"ENTER M FOR
MENU"
389 INPUT A$
390 IF A$="0" THEN GOTO 300
391 IF A$="M" THEN GOTO 8
400 CLS
401 PRINT "FEET TO METRES"
402 PRINT
403 PRINT "ENTER FEET?"
404 INPUT B
405 PRINT AT 4,0,B
406 PRINT AT 4,8,B*0.3048
407 PRINT AT 16,1;"ENTER 0 TO D
O MORE"
408 PRINT AT 17,1;"ENTER M FOR
MENU"
409 INPUT A$
410 IF A$="0" THEN GOTO 300
411 IF A$="M" THEN GOTO 8
420 CLS
421 PRINT "YARDS TO METRES"
422 PRINT
423 PRINT "ENTER YARDS?"
424 INPUT B
425 PRINT AT 4,0,B
426 PRINT AT 4,8,B*0.9144
427 PRINT AT 16,1,"ENTER 0 TO D
O MORE"
428 PRINT AT 17,1 "ENTER ■ FOR
MENU"
429 INPUT A$
430 IF A$="0" THEN GOTO 200
431 IF A$="M" THEN GOTO 8
440 CLS
441 PRINT "MILES TO KILOMETRES"
442 PRINT
443 PRINT "ENTER MILES?"
444 INPUT B
445 PRINT AT 4,0,B
446 PRINT AT 4,8,B*1.6093
447 PRINT AT 16,1,"ENTER 0 TO D
O MORE"
448 PRINT AT 17,1;"ENTER ■ FOR
MENU"
449 INPUT A$
450 IF A$="0" THEN GOTO 200
451 IF A$="M" THEN GOTO 8
700 CLS
701 PRINT "BRITISH EQUIVALENTS"
710 PRINT
720 PRINT "■■■■■■■■"
721 PRINT
723 PRINT "1 IN
= 2.54 CM"
725 PRINT "1 FT      =12 IN
= 0.3048 M"
730 PRINT "1 YD      =3 FT
= 0.9144 M"
735 PRINT "1 ROD     =5.5 YDS
= 5.0292 M"
740 PRINT "1 CHAIN   =22 YDS
= 20.117 M"
745 PRINT "1 FURLONG=220 YDS
= 201.17 M"
750 PRINT "1 MILE    =1760 YDS
= 1.6093 KM"
760 PRINT "1 NAUTICAL MILE
=6080 FT "
765 PRINT "   = 1.8532 KM"
766 PRINT
767 PRINT "ENTER C TO COPY"
768 PRINT "ENTER M FOR MENU"
769 INPUT A$
770 IF A$="C" THEN COPY
780 IF A$="M" THEN GOTO 8
```

Conversion
by L Maudsley

Break Key Disable

on ZX81

When using *Inkey$* to input data in a program, if *Break* is pressed (eg by a computer-ignorant user), the program will break, which may cause chaos if the user continues to press keys. This Machine Code program prevents the *Break* functioning, while allowing the user to enter a space.

It also has other useful effects: The program replaces:

```
10 PAUSE 40000
20 LET A= CODE INKEY$
```

with:

```
10 LET A = USR 16514 (or whatever address it is
   stored at)
```

The advantages are that pressing *Break* returns "0", so it is mug-proof. It only uses one line of Basic to call it. It is flicker-free in use (unlike *Pause*) and it returns with the code of the key pressed, therefore:

```
10 PRINT CHR$ (USR 16514 + 128)
```

will print the inverse of the key pressed.

The disadvantages are that it is slower(!) than Basic and it only works in *Slow* if you wish to retain the display (unlike *Pause*).

When used in a long program, it is an advantage to:

```
10 LET K = 16514
50 PRINT USR K (or whatever)
```

Other uses are:

```
MENU ....
20 GOTO (USR K - 28) * 1000
```

or:

```
20 DIM A (10)
30 LET A(1) = 1210 (ie line no. of option "1")
40 LET A(2) = 2340 (option "2")
MENU ...
50 GOTO A(USR K)
```

It uses 30 Bytes, and can be stored anywhere in Ram. If it is stored in a *Rem* statement at Line 1, then it is called by *Usr* 16514 (or K = 16514). Any suitable Machine Code loader may be used.

Break Key Disable
by A S Thornton

Machine Code Listing:

Decimal	*Hex*	*Comment*
205	CD	Wait for key to be released
187	BB	
2	02	
44	2C	
32	20	
250	FA	
205	CD	Wait for key to be pressed
187	BB	
2	02	
68	44	Load BC with corresponding number.
77	4D	
81	51	
20	14	Find character corresponding to the number now in BC, and load its character code into HL
40	28	
247	F7	
205	CD	
189	BD	
7	07	
78	4E	Load this number into BC, and push it onto the stack
6	[illegible]	
0	[illegible]	
197	C5	
205	CD	Wait again for key to be released
187	BB	
2	02	
44	2C	
32	20	
250	FA	
193	C1	Pop BC, and return to Basic.
201	C9	

Patterns

on Dragon

This is a program for drawing patterns of a regular nature on a Dragon 32. In its present listing it draws patterns in three colours on a buff background. However, it can easily be adapted to draw in a higher resolution, black lines on a buff background.

Program notes

10 doubles the normal speed of the computer
20-50 set up the screen and allocate values to the several variables in use.
70 plots the point on the screen
80 changes the value of x and y by either 1 or −1
90-100 check that the next point to be set lies within the parameters of the screen
110 provides the opportunity to have another pattern without having to break out of the program. Pressing any key will automatically cause the program to start again.
60 and 120 allow 10 points to be set without the colour altering, allowing the separate colours to be seen clearly.
130 starts the cycle again, this time in a different colour.

The resolution and colours of the screen can be altered easily, for example to draw black on buff in high resolution, delete lines 50, 60 and 140 and change line 10 to pmode 4, line 70 — replace c with 5 and line 150 *Goto* 70.

```
10 Poke 65495,0
20 Pmode3:Screen1,1:Pcls
30 A=1:B=1
40 X=Rnd(256):Y=Rnd(192)
50 C=Rnd(_)+5
60 For Z=1to5
70 Pset(X,Y,C)
80 X=X+A:Y=Y+B
90 If X>255 or X<1 Then A=-A
100 If Y>192 or Y<1 Then B=-B
110 If Inkey$ ""Then Run
120 Next Z
130 Goto50
```

Patterns
by Philip Magurn

Number Puzzle

on Spectrum

The object of this game is to rearrange the numbers in the grid back into their correct numerical sequence, reading either across or down. A score is kept of how many moves you make.

Program notes

Lines

5 Sets up colours (personal choice).

4000 to 4050 Instructions.

5000 to 6100 Draw Grid and set up start position. Because of the possibility of producing a random start position that could not be solved, I have created three start positions, stored in Q$ at lines 6000, 6050 and 6100. These positions were found by mixing up a completed grid, using legal moves. Then, reading left to right going down the grid, the numbers were recorded then stored in Q$. Q$ may be changed, but only by a sequence found using the method described.

300 to 360 Generate the user definable characters (A,B,C,D). This is used every time a number is moved, as each number is regenerated before every move.

1000 to 1024 Restore *Data* to relevant position. Position depends on number to be moved.

1040 to 1070 Detect empty square

1295 to 1380 Produce move. Blank out old position and reprint new position

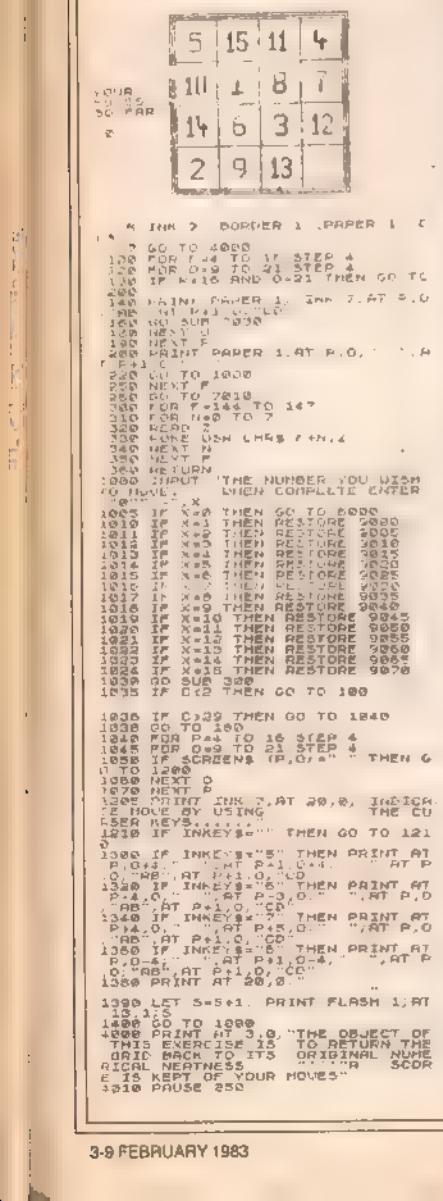
9000 to 9074 *Data* To generate the 15 enlarged numbers

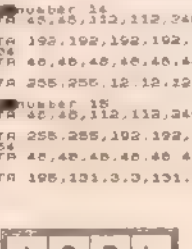
9080 to 9020 End routine.

There are no mug traps in the move section of the program, so always move towards the blank square. Movement is via the curser keys.

The following DATA statements are not too clear on the printout:

018 DATA 24,24,24,24,24,24,24,24
026 DATA 1,3,6,12,24,24,27,31
027 DATA 128,0,0,0,0,0,224,240
028 DATA 24,24,24,24,24,24,15,7
029 DATA 24,24,24,24,24,24,240,224
031 DATA 31,31,0,0,0,0,1,1
032 DATA 248,248,24,48,96,192,128,126
034 DATA 128,128,128,128,128,128,128,128
061 DATA 48,48,112,112,240,240,48,48
062 DATA 124,254,131,131,3,3,7,62





Number Puzzle
by John Crawford

Generator

on Vic

This program generates another program, which, when run, adds a new word to Basic. The new word is 'OLD' and its function is to recover a program which has been 'NEWED'. To achieve this just type OLD. (This program must be loaded first.)

The program listed is the Basic loader. When run, it checks the data and gives error reports providing that the line numbers and number of data elements per line are not changed (*Rems* may be left out). The program then automatically loads the machine code into memory. The machine code is then tagged on to the end of another program one third of the length of the loader.

Note that the loader is lost at this stage, and so must be saved first. Finally, save the program now in memory. This is the working copy. When run, this final program relocates the machine code to the top of available memory and lowers the pointers so no Basic program can touch it. It then breaks chargot to set up the new keyword. The programs both adjust to run on any configuration of Vic20.

```
0 REM●●●●●●●●●●●●●●●●●
2 REM● B. MCINTYRE. ●
4 REM●13 KING STREET●
6 REM● KIRKCALDY. ●
8 REM●●●●●●●●●●●●●●●●●
10 FOR LP = 0 TO 204 STEP 15
20 FOR CT = 0 TO 14
30 READ A : POKE(6400+LP+CT),A : CHK = CHK + A
40 NEXT CT
50 READ SUM
60 IF SUM <> CHK THEN PRINT"□DATA ERROR ■■ LINE"(LP/1.5)+90 : END
70 CHK = 0  NEXT LP
80 PRINT"□'OLD' PROGRAM NOW IN  MEMORY" SYS6400
90 DATA 169,46,162,25,133,251,134,252,160,2,177,251,145,43,200,2150
100 DATA 200,249,165,44,133,46,165,43,105,233,144,2,230,46,133,1946
110 DATA 43,169,96,141,209,25,32,162,25,169,196,72,169,115,72,1697
120 DATA 76,96,198,10,8,150,40,194,40,32,52,41,172,30,53,1232
130 DATA 54,170,194,40,52,91,41,170,51,40,41,30,162,0,0,1132
140 DATA 0,165,55,56,233,140,176,2,198,56,133,55,165,44,133,1613
150 DATA 252,165,43,24,105,84,144,2,230,252,133,251,160,140,136,2129
160 DATA 0,177,251,145,53,40,200,247,169,32,133,117,165,55,133,1935
170 DATA 110,165,56,133,119,169,234,133,120,96,200,2,230,123,165,2071
180 DATA 58,201,255,240,1,96,173,0,2,201,79,200,240,173,1,1936
190 DATA 2,201,76,208,241,173,2,2,201,68,208,234,134,253,132,2135
200 DATA 254,165,43,133,251,169,44,133,252,160,3,200,177,251,240,2471
210 DATA 7,192,91,208,247,164,254,96,152,56,181,251,144,2,230,2195
220 DATA 252,132,251,160,0,165,251,145,43,165,252,200,145,43,160,2363
230 DATA 0,177,251,170,200,177,251,224,0,240,6,134,251,133,252,2466
240 DATA 200,230,201,0,208,246,165,251,24,105,2,144,2,230,252,2276
250 DATA 133,251,133,45,133,47,133,49,165,252,133,46,133,48,133,1834
260 DATA 50,165,55,133,51,165,56,133,52,166,253,164,254,169,2,1868
270 DATA 133,122,169,58,141,2,2,96,0,0,0,0,0,0,0,723
■ERRY.
```

Generator
by David McIntyre

Mutant Wars

on BBC Micro

Mutant Wars is an arcade-type game which is fast, flicker-free and very addictive. The screen shows the players score and the number of waves encountered. The idea of the game is to stop the Mutants from reaching Earth by shooting them as they jump down through the atmospheric layers.

The controls are:

Z . . Left
X . . Right
SHIFT . . Fire

The program runs so fast because of the speed of BBC Basic, the use of multi-statement lines and the use of the VDU commands instead of *Colour* for example. The program takes up 5.5K in Mode 6 and will run on both models. I chose mode 6 because it allows user definable graphics with the minimum of memory loss.

The program works by scrolling 38 individual text windows, each containing a mutant. This is why it is so flicker-free.

A special feature of the BBC micro allows the player to fire whilst still moving. This is done in line 490, where −1 is the special number of the shift key.

Program notes

Line	
90	Sets up the error trap.
110	Moves the TV picture down one line.
120 to 130	Change the repeat and delay on all keys for smooth movement.
140	Stops editing cursor from spoiling display if cursor keys are depressed.
150	Change display to mode 6.
170	Define envelope for mutants moving.
180	Initialise most of variables.
190	Remove cursor and define characters.
210	Clears screen, prints title, changes foreground and background colours.
220 to 250	Calls procedures to play game.

List of procedures

PROCTIT	Used as time delay.
PROCGAME	Contains main loop and is used to call most of the other PROCS.
PROCBASE	Controls the movement of the laser base.
PROCSPACE	Rubs out laser base.
PROCFIRE	Displays bullet and checks for hit.
PROCEND	Called when player is invaded. This procedure also calls the invasion tune.
PROCSTART	Sets up new screen and increases the difficulty level.
PROCTUNE	Plays "Song Song blue" when invaded.
PROCHIT	Called when an alien is hit. Adds to the score and displays new score.

PROGRAM OF THE WEEK

```
10 REM ●●●●●●●●●●●●●●●●
20 REM ● .              ●
30 REM ● MUTANT WARS    ●
40 REM ●                ●
50 REM ● by A.HYNES     ●
60 REM ●                ●
70 REM ●●●●●●●●●●●●●●●●
80 REM
90 ON ERROR GOTO 580
100 REM
110 *TV 255,0
120 *FX 12,1
130 *FX 11,1
140 *FX 4,1
150 MODE 6
160 REM
170 ENVELOPE 1,1,-26,-36,-45,255,255,255,127,0,0,0,126,0
180 DIM SX(39):DIF=6:BX=20:BY=24:BX1=20:SCORE=0:B=0:WAVE=0:S$=STRING$(40," ")
190 VDU 23;8202;0;0;0;23,255,195,36,126,219,126,195,126,165,23,225,90,60,231,36,
126,90,66,231
200 REM
210 PRINT TAB(8,11);"HERE COME THE MUTANTS":PROCT(300):VDU 12,19,1,4,0,0,0,19,0,
7,0,0,0
```

```
220 SOUND 1,1,1,1
230 PROCSTART
240 PROCGAME
250 GOTO 230
260 END
270 REM
280 DEFPROCT(T):TIME=0:REPEAT UNTIL TIME>T:ENDPROC
290 REM
300 DEFPROCGAME:KILL=0
310 FOR X=1 TO 38
320 IF SX(X+1)=0 AND (X/3=INT(X/3)):PROCBASE:GOTO 390
330 IF SX(X+1)=0 GOTO 400
340 PROCBASE
350 IF B=1 THEN PROCFIRE
360 IF RND(1)<.85 THEN 390
370 PROCT(10-DIF)
380 VDU 28,X,23,X,1,30,11,26:SX(X+1)=SX(X+1)+1:IF SX(X+1)=23 THEN PROCEND
390 IF BX(>BX:PROCSPACE
400 IF B=1 THEN PROCFIRE
410 NEXT
420 IF KILL>=38 THEN 440
430 X=38:GOTO 310
440 ENDPROC
450 REM
460 DEFPROCBASE:*FX 15,1
470 PRINT TAB(BX,BY);CHR$(225);
480 RESP$=INKEY$(5)
490 IF INKEY(-1)=-1 AND B=0:BLX=BX:BLY=BY:B=1:SOUND 3,-15,200,3
500 IF RESP$="Z" THEN BX=BX-1:IF BX<1 THEN BX=1
510 IF RESP$="X" THEN BX=BX+1:IF BX>38 THEN BX=38
520 ENDPROC
530 REM
540 DEFPROCSPACE
550 PRINT TAB(BX(,BY);" ";
560 BX(=BX:ENDPROC
570 REM
580 MODE 7:IF ERR<>17:REPORT:PRINT" at line ";ERL
590 *FX 12,0
600 *FX 4,0
610 SOUND 1,0,0,1:END
620 REM
630 DEFPROCEND:PRINT TAB(0,10);S$;TAB(0,11);S$;TAB(0,12);S$;TAB(15,11);"GAME OVE
R"
640 SOUND 0,-15,60,10:SOUND 1,0,0,1:PROCT(40):PROCTUNE
650 PROCT(250):VDU28,0,24,39,1,12,20:PRINT TAB(8,10);"Press SPACE bar to play":*
FX 15,0
660 REPEAT UNTIL GET$=" "
670 RUN
680 REM
690 DEFPROCFIRE:VDU 28,BLX,23,BLX,BLY-1,12,26:BLY=BLY-1:PRINT TAB(BLX,BLY);"|";
700 IF SX(BLX+1)>=BLY:PROCHIT:GOTO 720
710 IF BLY<3:VDU 28,BLX,23,BLX,2,12,26:SX(BLX+1)=0:B=0
720 ENDPROC
730 REM
740 DEFPROCSTART
750 WAVE=WAVE+1:DIF=DIF+2:IF DIF>16 THEN DIF=16
760 FOR X=1 TO 38:Y=RND(DIF)+2:SX(X+1)=Y:PRINT TAB(X,Y);CHR$(255):NEXT
770 VDU 17,129,17,0:PRINT TAB(0,0);S$;TAB(2,0);"SCORE ";SCORE;TAB(29,0);"WAVE ";
WAVE:VDU 17,1,17,128
780 ENDPROC
790 REM
800 DATA 69,24,53,24,81,24,73,6,69,2,61,6,53,2,61,8,81,24
810 REM
820 DEFPROCTUNE
830 FOR S=1 TO 9:READ F,E
840 SOUND 2,-15,F,E:SOUND 2,0,0,2:NEXT
850 ENDPROC
860 REM
870 DEFPROCHIT
880 SCORE=SCORE+10:VDU 28,BLX,23,BLX,2,12,26,17,0,17,129:PRINT TAB(8,0);SCORE
890 SX(BLX+1)=0:VDU 17,1,17,128:B=0:SOUND 0,-15,60,2:KILL=KILL+1
900 ENDPROC
```

Mutant Wars
by Alan Hynes

Battlestar

Preliminary Results

The first phase of **Battlestar**, *Popular Computing Weekly*'s unique, computer moderated, play-by-mail, space adventure game, has now closed. The names of the 245 players winning through are now being sorted. They will all shortly receive a voucher giving them £10 off a ZX Printer.

Most of you had little difficulty in answering the questions correctly. For the few who got some of them wrong, here are the answers:

1) **Harrison Ford** played Han Solo in *Star Wars* and Deckard in *Blade Runner*.
2) **The Empire Strikes Back** was the sequel to *Star Wars*.
3) In the film *Tron* the letters MCP stood for **Master Control Program**.
4) The two robots in *Star Wars* were called **R2D2** and **C3PO**.
5) *ET* was trying to 'phone **home**.

More news on **Battlestar** next week, as the first round in space begins.

The Cruising Competition

£10 is the prize each month for the highest score on Cruising, the new machine code game from *Solarsoft* for the ZX Spectrum.

The entries for each month should arrive at the *Popular Computing Weekly* offices at least five working days before the end of the month. Entries for March, therefore, should arrive here by 22 February.

Each entry should be accompanied by a print-out of the high score, using the special printer routine and code number generated by each game. No High Score can win more than once.

To give you something to aim for, here are our best scores so far:

1) *Duncan Scot* **2264**
2) *Brendon Gore* **1800**
3) *David Kelly* **246**

Two aspects of coding

Geoff Wilkins shows two machine-code routines for the Spectrum

Here are two short machine-code routines for the Spectrum that do nothing useful at all except to demonstrate some essential aspects of coding the machine. These are: *reading the keyboard, printing on the screen, controlling the colours* (by two different methods), coding the *user-defined characters*, and *moving the print-position* — with particular regard to differences between the Spectrum and the ZX80/81.

The first routine can easily be loaded to addresses 32256 ■ 32310 with the following Basic loader-program:

```
10 CLEAR 32255
20 FOR A=32256 TO 32310
30 READ N: POKE A,N
40 NEXT A
50 DATA 205,36,126,135,135,135
50,143,92,6,32,62,215,16,251,
205,36,126,79,58,143,92,129,50,
143,92,6,8,62,217,215,16,251,24,
229
■ DATA 151,50,8,92,58,8,92,254,
9,40,249,214,48,167,254,8,48,238,
201
```

If you've already got your own hex-loader for the Spectrum, the hex-code is:

```
7E00  CD247E
7E03  B7
7E04  B7
7E05  B7
7E06  328F5C
7E09  0620
7E0B  3E20
7E0D  D7
7E0E  10FB
7E10  CD247E
7E13  4F
7E14  3A8F5C
7E17  B1
7E18  328F5C
7E1B  0608
7E1D  3ED9
7E1F  D7
7E20  10FB
7E22  18DC
7E24  97
7E25  32085C
7E28  3A085C
7E2B  FE00
7E2D  28F9
7E2F  D630
7E31  A7
7E32  FE08
7E34  30EE
7E36  C9
```

Once you've loaded the code, enter the command NEW, and then the line

```
PRINT USR 32256
```

Run this, and you should confront ■ blank screen. Nothing will happen unless you press one of the numeral-keys 0-7. The first such key you press will produce a line of spaces in the appropriate *Paper* colour on the screen; the next will produce a line with the same *Paper* colour, but with the word *Ink* printed eight times in the new key's *Ink* colour. The next key will produce a line in a new *Paper* colour; and so on.

This is ■ disassembled listing of the program:

```
Address  Instruction
32256    CALL 32292
32259    ADD A,A
32260    ADD A,A
32261    ADD A,A
32262    LD (23695),A
32265    LD B,32
32267    LD A,32
32269    RST16
32270    DJNZ —5
32272    CALL 32292
32275    LD C,A
32276    LD (23695)
32279    ADD A,C
32280    LD (23695),A
32283    LD B,8
32285    LD A,217
32287    RST16
32288    DJNZ —5
32290    JR —36
32292    SUB A,A
32293    LD (23560),A
32296    LD A,(23560)
32299    CP 0
32301    JR Z —7
32303    SUB A,48
32305    AND A
32306    CP 8
32308    JR NC —10
32310    RET
```

The program starts by calling a sub-routine ■ address 32292. This is a *Keyboard Read* routine. It uses the system variable *Last K*, at address 23560, which stores the code of the last-pressed key. The sub-routine Pokes zero into this address — the Spectrum has no character for code zero — and then goes into a loop which only breaks when *Last K* gets a value other than zero.

When such a value has been found, addresses 32303 to 32309 subtract 48 from *Last K* — 48 being the difference between 0—7 and *Code*"0"—*Code*"7". ■ the result is more than 7 — ie if any key had been pressed other than the numeral-keys 0—7 — the sub-routine jumps back to its start; otherwise, it returns to the main routine, with a value 0—7 ■ the A-register.

The principle of this use of the system variable *Last K* can be used in any routine that needs to read the keyboard and transfer information from keys pressed into a register — this, of course, is the machine-code equivalent of *Inkey$* in Basic. (The *Inkey$* function is ■ fact easier to reproduce in machine code than the *Input* function.)

The next addresses, 32259 to 32264, multiply the A-register value by 8, and load the result into address 23695. This is the system variable *Attr T*, storing values for "temporary current colours".

Both this system variable and the system variable *Attr P* for "permanent current colours", at address 23693, store values for colours ■ the same way: ■ 7 stores ■ or 1 for *Flash*; bit 6 stores ■ or 1 for *Bright*; bits 5 to 3 store 0—7 for *Paper*; and bits 2 to 0 store 0—7 for *Ink*.

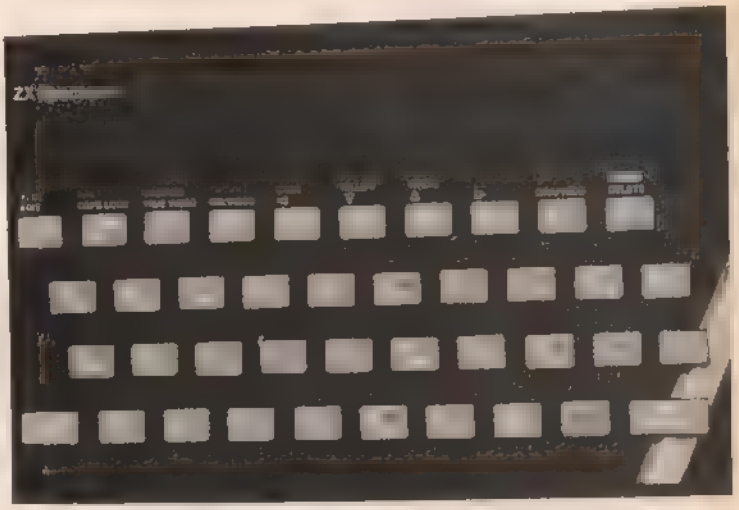
Thus by multiplying the A-register value by 8 and then poking ■ into *Attr T* we are altering the temporary *Paper* colour according to the value 0—7 in the A-register.

Addresses 32265 to 32271 print a space (code 32) of *Paper* colour 32 times. As the manual tells us, because of the Spectrum's more complex display-file, one cannot poke directly on to the screen as easily as with the ZX80/81. Fortunately, the machine-code instruction *"Rst16"* works just as well on the Spectrum, printing the character whose code is in the A-register at the next print-position.

Addresses 32272 to 32282 call the *Keyboard Read* sub-routine again, and then add the returned A-register value 0—7 unmodified to the value in the *Attr T* system variable. This has the effect of changing the temporary *Ink* colour while leaving the *Paper* colour unchanged.

Addresses 32283 to 32289 print the character with code 217 — *Ink* — eight times across the screen in the new *Ink* colour on the unchanged *Paper* colour.

Finally, addresses 32290 to 32291 jump



back to the start of the routine. The program will continue, with no chance of breaking out, until you fill the screen and elicit the "scroll?" query. In the present program, pressing the "N"-key at this point is a handy way of getting back to Basic. But often, in both Basic and machine-code programs, the "scroll?" is just a nuisance. You can get rid of it in machine-code, as in Basic, by poking the system variable at address 23692. In the present program, simply replace.

```
32310    201   RET
```

by

```
32310    245   PUSH AF
32311     62   LD A,255
            255
32313          LD (23692),A
            140
             92
32316    241   POP AF
32317    201   RET
```

(Hex-code is:

```
7E36  F5
7E37  3EFF
7E39  328C5C
7E3C  F1
7E3D  C9.)
```

This will get rid of "scroll?"; but now, the only way of stopping the program is by pulling out the plug. Of course, using the *Keyboard Read* sub-routine, it would be easy to include a means of breaking out within the routine — e.g. by pressing the space-key.

What happens if we change our Basic line

```
10 PRINT USR 32256
```

to

```
10 RANDOMIZE USR 32256
```

On the ZX80/81 that would make no difference to the program like this. It does not of itself return to Basic; but with the Spectrum you'll find that the colour-lines print upwards from the bottom two lines of the screen, and soon produce an "Out of screen" error-report.

Print Usr works perfectly well with the present program; but sometimes you won't want to use it because, on return to Basic, it will print the value of the BC-register to the screen. You can get round this problem by using

```
PRINT: RANDOMIZE USR (address)
PRINT:: LET A=USR (address)
```

and so on.

The second routine might be the start of a machine-code "Space Invaders" program. You can use the same loader-program as before, changing line 20 to

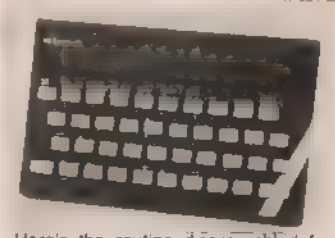
```
20 FOR A=32256 TO 32326
```

and changing the DATA-lines

```
  50 DATA 195,36,60,99,126,24,24,102,
0,0,8,8,28,62,127,127
  60 DATA 1,16,0,33,0,126,17,88,127,
237,176
  70 DATA 62,16,215,62,2,215,62,22,
215,62,19,215,62,0,215
  80 DATA 6,16,62,144,215,62,32,215,
16,248,62,16,215,62,1,215,62,22,215,
62,21,215,62,9,215,62,145,215,201
```

Here's the hex-code listing:

```
7E00  C3243C
7E03  5A
7E04  7E
7E05  1818
7E07  66
7E08  00
7E09  00
7E0A  06
7E0B  08
7E0C  1C
7E0D  3E7F
7E0F  7F
7E10  011000
7E13  21007E
7E16  11587F
7E19  EDB0
7E1B  3E10
7E1D  D7
7E1E  3E02
7E20  D7
7E21  3E16
7E23  D7
7E24  3E0A
7E26  D7
7E27  3E00
7E29  D7
7E2A  0610
7E2C  3E90
7E2E  D7
7E2F  3E20
7E31  D7
7E32  10F8
7E34  3E10
7E36  D7
7E37  3E01
7E39  D7
7E3A  3E16
7E3C  D7
7E3D  3E15
7E3F  D7
7E40  3E09
7E42  D7
7E43  3E91
7E45  D7
7E46  C9
```



Here's the routine disassembled from address 32272; this is because the first 16 addresses, 32256—32271, hold data for the user-defined graphics, and would be meaningless disassembled:

```
32272    LD BC,16
32275    LD HL,32256
32278    LD   ,32600
32281    LDIR
32283    LD A,16
32285    RST 16
32286    LD A,2
32288    RST 16
32289    LD A,22
32291    RST 16
32292    LD A,10
32294    RST 16
32295    LD A,0
32297    RST 16
32298    LD B,16
32300    LD A,144
32302    RST 16
32303    LD A,32
32305    RST 16
32306    DJNZ —8
32308    LD A,16
32310    RST 16
32311    LD A,1
32313    RST 16
32314    LD A,22
32316    RST 16
32317    LD A,21
32319    RST 16
32320    LD A,9
32322    RST 16
```

```
32323    LD A,145
32325    RST 16
32326    RET
```

You can run this with the command

```
CLS : PRINT:: RANDOMIZE USR 32272
```

This should produce a row of red space-invaders about halfway down the screen, and a blue defender at the bottom.

Addresses 32272—32281 *Poke* the data from the routine's first 16 addresses into the first 16 addresses of the Spectrum's user-defined graphics, 32600—32615. (Note: these latter addresses apply only to the 16K Specrrum; on the 48K model the user-defined graphics start at address 65368 — so you need to change address 32280 in the routine to 255 instead of 127 (hex address 7E18 to FF instead of 7F).) This data is, of course, for the space-invader and the defender.

The rest of the routine is almost entirely taken up with instructions to load the A-register with different values and then print by the instruction "RST 16". However, these instructions don't just print characters on the screen — they also serve to alter the colours and the print-position. If you look in chapters 15 and 16 of the Spectrum manual, you'll see that characters 6 to 23 of the character set can be printed in various combinations and with numeral-characters to alter the print-position, colour, brightness, flash etc. The good news is that you can do the same in machine-code — which is quite a substantil compensation for the difficulties in poking directly into the Spectrum's display-file.

I'll leave it to you work out, by referring to the manual's chapters, how the different machine-code instructions in the routine alter colour and print-position, and to experiment with the many other possibilities. (My routine could have been much more neatly written by putting the characters to be printed into a data-list; I'll leave you to try that as well.) If you go further and use the *Keyboard Read* sub-routine from the first routine, you can think about moving characters both on their own and via the keyboard — and then you're well on your way to a genuine "Space Invaders' program!

Finally, as a pendant to my piece on redefining the Spectrum keyboard in *PCW* no. 24 (30 September 1980), here's a little novelty that produces an *"Australian Keyboard"*:

```
10 CLEAR 31743
20 FOR A=15616 TO 16383 STEP 8
30 FOR N=0 TO 7
40 POKE A+16128+N, PEEK (A+8-N)
50 NEXT N: NEXT A: POKE 23607,123
```

■

Specifying corners

***David Lawrence** continues his commentary on lines 2060-2180 of Module 5 of his Characters program.*

On calling up this section by the use of the 'M' key in the previous module, the user is asked to specify a corner. If corner four is specified, then a rectangle is defined with two opposite corners consisting of grid corner 1 (the corner opposite four) and the current position of the cursor. This rectangle is then moved so that the corner defined by the cursor is relocated in grid corner 4. This may sound complex but a little experimentation will show that it is in fact a neat and simple means of moving the contents of the grid around. It is important to remember that if the design is to be moved down two lines, the bottom two lines of the design will be lost and similarly for moves in other directions.

2070 This line draws a large "M" next to the grid to show that the move function has been called — it seemed like a good idea at the time. The empty loop in this line serves the important function of seperating the input named T$ in the previous module and one called T1$ which is about to be called for. Without this delaying loop there is a danger that if the user's finger lingers on the 'M' key when calling up this function, the *Inkeys* function at line 2090 will define T1$ as 'M' too. This delay is neccesary whenever using a succession of *Inkeys* inputs.

2080 MX and MY are the variables which will be used to record the distance the defined rectangle must be moved. X1, Y1, X2 and Y2 will record the opposite corners of the defined rectangle.

2100-2130 These variables are set according to the corner specified as the destination of the move and the current position of the cursor. Again for no particular reason, the number of the corner chosen as a destination is drawn next to the grid.

2140 If an erroneous input is made when the program is expecting a corner to be specified, the "M" is erased and control is returned to Module 4.

2150-2170 Having established the size of the rectangle to be moved and the amount of movement necessary, these values are divided by four so that they can be applied to the array A and the transformation accomplished in transferring the contents to the array B.

Testing

The three functions specified in the commentary should now be available.

Module 6: *Lines 3000-3300*

Having established the functions necessary to define and manipulate a character on the grid, we come to the heart of the program, the module which takes the design which the user has created and transforms it into a string which, when DRAWn, will reproduce the desired character or design.

Commentary

3030 Since elements in the design will be erased from the array as they are incorporated into the string, the process is actually carried out on a copy of the main array.

3040 The letters contained in DI$ are the eight directions which can be handled by the *Draw* command. E$ will contain the string defining the design or character.

3050 X and Y are used to register coordinates on the grid. D1 and D2 are used to record the vertical and horizontal elements of the direction in which a line is currently being *Drawn*.

3060 and 3250 The loop defined by these two lines scans through the grid, ignoring empty squares.

3070-3120 For reasons that will be seen later, the fact that program execution has arrived at this point shows that the square currently defined by I and J is inked in but that it does not follow on in a continuous line from any part of the design previously recorded in E$. The location of the square is therefore recorded in the form of a B(lank) M(ove) within the string. The first square to be recorded in this fashion will always be the top left-hand square in the design and its position will be defined in relation to the top left-hand corner. Other squares to be recorded in the BM format will be defined in relation to wherever *Drawing* last left off. The drawing position is updated to the current square and the square is erased so that it cannot figure twice in the design.

3130 If the element at Y+D1,X+D2 is not zero, then since D1 and D2 contain the direction in which a line is currently being drawn, the loop examining surrounding squares is jumped around.

3140-3170 If a current direction cannot be continued, this loop examines surrounding squares to see if there is any direction in which *Drawing* may continue. If no such continuation is found then to E$ is added the direction and length of the line which has been traced in the design.

3190-3200 If it is possible to draw from the current square, the direction is checked to see if it is the direction of a line currently being drawn, if so the variable NN is incremented. If it is a new direction, the direction and length of the previously traced line are added to E$. The value attached to any particular direction is calculated by the formula at line 3190 and this value corresponds to the position of the relevant letter in DI$ (defined at line 3040). It may be worth noting in passing that this formula can come in useful in a variety of circumstances where a direction on a rectangular grid requires to be recorded. The values which the line will produce for the eight possible directions are as follows:

```
1 2 3
4 * 5
6 7 8
```

Compare this with the letters specified in DI$ and you will see why they are arranged as they are. The variables D1 and D2 are vertical and horizontal elements of the direction and range between −1 and +1.

3260 This line simply ensures that any *Drawing* left unfinished at the end of the loop is completed.

***The Working Dragon 32**, by David Lawrence, costs £5.95 and is available from **Sunshine Books Ltd.**, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

Module 6

```
3000 REM*************************
3010 REM EXTRACT STRING
3020 REM*************************
3030 FOR I=0 TO 31:FOR J=0 TO 31:LET B(I,J)=A(I,J):NEXT J,I
3040 LET DI$="HUEULRGDF":LET E$=""
3050 LET X=0:LET Y=0:LET D1=0:LET D2=0:LET DIR=0
3060 FOR I=0 TO 31:FOR J=0 TO 31:IF B(I,J)=0 THEN GOTO 3250
3070 LET E$=E$+"BM":IF J-X>0 THEN LET E$=E$+"+" ELSE LET
E$=E$+"-"
3080 LET E$=E$+MID$(STR$(ABS(J-X)),2)+","
3090 IF I-Y>0 THEN LET E$=E$+"+" ELSE LET E$=E$+"-"
3100 LET E$=E$+MID$(STR$(ABS(I-Y)),2)+",R0,"
3110 LET X=J:LET Y=I
3120 LET B(Y,X)=0
3130 IF Y+D1>=0 AND Y+D1<=31 AND X+D2>=0 AND X+D2<=31 THEN
IF B(Y+D1,X+D2)>0 THEN GOTO 3190
3140 FOR K=-1 TO 1:FOR L=-1 TO 1
3150 IF X+L>31 OR X+L<0 OR Y+K>31 OR Y+K<0 THEN GOTO 3170
3160 IF B(Y+K,X+L)>0 THEN LET D1=K:LET D2=L:GOTO 3190
3170 NEXT L,K:IF DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+MID$
(STR$(NN+1),2)+";"
3180 LET DIR=0:LET D1=0:LET D2=0:LET NN=0:GOTO 3250
3190 LET T1=3*(D1+1)+D2+2:IF T1>4 THEN LET T1=T1-1
3200 IF T1=DIR THEN LET NN=NN+1
3210 IF T1<>DIR AND DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+
MID$(STR$(NN+1),2)+"," LET NN=0
3220 LET DIR=T1
3230 LET X=X+D2:LET Y=Y+D1
3240 GOTO 3120
3250 NEXT J,I
3260 IF NN<>0 AND DIR<>0 THEN LET E$=E$+MID$(DI$,DIR,1)+MID
$(STR$(NN+1),2)
3270 DRAW "S8;C3;BM150,60;"+E$
3280 IF INKEY$="" THEN GOTO 3280
3290 FOR I=0 TO 63:DRAW "C2;BM150,"+STR$(60+I)+";R64":NEXT I
3300 LET X=0:LET Y=0:DRAW "S4":RETURN
```

The Working Spectrum

(228 page book)
The first well-documented collection of serious programs for the ZX Spectrum. Programs include a Basic Renumber which can handle Gotos and Gosubs, a character dictionary, a file-handler, several utility programs and a few games. Each program is built up out of re-usable subroutines.

£5.95*

The Working Dragon 32

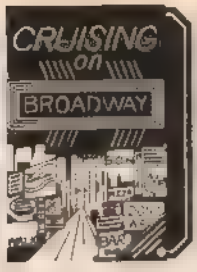
This is a companion volume to The Working Spectrum and includes several new features such as a Text Editor and a Music Composer and Editor. Other programs help you use the Dragon 32 as an accountant, for more advanced high resolution graphics, as a home tutor for education and for playing games. Each of the programs and subroutines is explained line by line to help develop your own programming skills.

£5.95*

Best of Popular Computing Weekly

Cassette
Four of the top Spectrum and ZX81 games from Popular Computing Weekly are recorded on this one cassette. The games are Laserchase for the 16K & 48K Spectrum, Kong's Revenge for the 16K & 48K Spectrum, Robot Control for the 16K ZX81 and Alien Attack, a Space Invaders type game for the 1K ZX81

£4.45



Cruising (on Broadway)

cassette
Play Cruising, a new, fast, machine code game of skill for the 16K or 48K ZX Spectrum computer. You won't be able to beat it – the more you practice the faster it gets. Cash prizes are being offered for the highest recorded scores. See Popular Computing Weekly every Thursday for details.

£4.95*

Please send me
Qty*
- ☐ **The Working Spectrum** at £5.95 each
- ☐ **The Working Dragon 32** at £5.95 each
- ☐ **Best of Popular Computing Weekly** at £4.45 each
- ☐ **Cruising (on Broadway)** at £4.95 each

I enclose a cheque/postal order for
£
payable to
Sunshine Books Ltd.
19 Whitcomb Street,
London WC2 7HF

Name

Address

Signed

We can normally deliver in four to five days.

*Available from W. H. Smith's and computer dealers.

A New Range From Sunshine Books Ltd

MICROS NOW IN STOCK

BBC MODEL B & **DRAGON 32K**

FROGGER	GOLF
PLANES	ALCATRAZ II
SPACE KINGDOM	PLANET INVASION
GLAVIANS	STARTREK

A VAST SELECTION OF CASSETTES, CARTRIDGES AND JOYSTICKS FOR BOTH COMPUTERS . . .
. . . AND PRINTERS from **£235**

STATACOM LTD, 234 HIGH STREET
SUTTON, SURREY SM1 1NX
01-661 2266

FED UP WITH SPACE INVADERS?

M.C.LOTHLORIEN

offers you hours of stimulating entertainment with their challenging range of **wargames** for the **SPECTRUM, ZX81, DRAGON 32**

- **SAMURAI WARRIOR** — could you have been **SHOGUN** in the 13th Century Japan?
  Price: Spectrum £5.50 16K ZX81 £4.50
  DRAGON 32 £6.95
- **TYRANT OF ATHENS** — can you guide Athens to survival against many other hostile states?
  Price: Spectrum £5.50 16K ZX81 £4.50
  DRAGON 32 £6.95
- **ROMAN EMPIRE** — How good a general are *you?*
  Price: Spectrum £5.50 16K ZX81 £4.50
- **PELOPONNESIAN WAR** — can you defeat those nasty SPARTANS?
  Price: 16K ZX81 only £4.50
- **WARLORD** — how well can you protect your village?
  Price: 16K ZX81 only £4.50. Dragon 32 £6.95

Cheques or PO's please — made payable to:
M.C. LOTHLORIEN, DEPT. P.3
4 GRANBY ROAD, CHEADLE HULME
CHESURE SK8 6LS

IT STORES EVERY PIXEL

Mr J Martin of Clarence Road, Walthamstow, London E17, writes:

Q I have a Spectrum and have used the command SCREEN$ to save a picture, and LOAD it back, but I cannot find any way of using it. As soon as I press ENTER it disappears and I cannot find anyway of retrieving it.

A *Screen$* is a command that stores every pixel on the screen. When you enter a command such as *Enter* then you are asking the computer to print on the screen a listing of the program. This it does and, of course, it overprints the current screen display in the process.

The way round this is to auto run the program, which will return the control to you. If you use a *Print At* statement at 21, 0 the print position will be on the bottom line, which will give you some work space. You would lose whatever was displayed on this line.

COMING IN THE MONTHS AHEAD

Andrew Jones of Old Road East, Gravesend, Kent, writes:

Q I am thinking of buying a Jupiter Ace microcomputer. Do you know if there is much software available for the unexpanded version? I would also like to know the difference between Basic and Microsoft Basic.

A The Jupiter Ace is based around Forth 79, though there are some differences. Programs in this should generally work without major changes, though some words in the Ace's dictionary are not to be found in Forth 79 and vice versa.

Remsoft (18 George Street, Brighton, Sussex) has produced two cassettes for the Ace — *Peeker*, which costs £3.50 and enables you to unravel both Rom and Ram, and *Tape 2*, which costs £4.50 and includes *Night Rider*, *Sketch* and *Editor*. More software should become available in the coming months.

Basic has several dialects. Microsoft Basic is probably the most common form. Like most Basics found on home computers, Microsoft differs from its fellows in relatively minor ways.

The form of Basic used on the Sinclair computers is probably the most common after the Microsoft version, by virtue of the large number of Sinclair computers in circulation. It is interesting to note that the Sinclair Basic is very similar to the new Ansii standard for Basic. Perhaps this form will gain more ground.

COMMAND WAS CORRECT

Paul Gurney of Hereford Road, Hereford, writes:

Q I have a 16K Spectrum. On page 169 of the manual it says that if you enter *Clear* 23800 as a direct command, it will give you an idea of what happens when the memory becomes full. All I get when I do this is *M-Ramtop* no good. This even happens when I try it as soon as I switch on. I do not really understand what is wrong. Is there anything wrong with my Spectrum?

A There is nothing wrong with your Spectrum. This is the result that you were meant to obtain. *Clear* and *Clear n* are commands that in effect *New* certain of the routines in the computer.

One of the effects of *Clear* 23800 is to lower Ramtop to that address. *Clear n* will always lower Ramtop to the specified address, but in this case you have lowered it so much that there is no room for the Basic program or instructions.

If you look at page 165 of your manual there is a memory map. Look at how much has to be fitted in between 23734 and Ramtop. This command gives you just 66 bytes (23800 — 23734) for this entire area. No wonder there is no room, and an error code comes up. If you look at *Clear* and *Clear n* in the appendix, you will see just what sort of effect they will have on a program.

THE MANUAL IS COMING SOON

Gary Foreman of Hazelton Road, Colchester, Essex, writes:

Q Now that the Commodore 64 is here, and I have access to one, I would like to know if the memory map locations are listed anywhere. There is nothing about them in the manual. This would enable me to start writing some machine code programs, and make use of the User Defined Graphics. Also is there any news of a Commodore 64 Programmers Reference Guide, similar to that for the Vic-20?

A These two questions have effectively the same answer. Although I have not seen it, I gather that the 64 Programmers Manual will have a much more complete breakdown of the 64's memory addressing. It is due for release soon, though at the time of writing I do not know how much it will cost. I presume it will be available from all the usual Commodore dealers.

NO NEED TO GO BACK TO BASIC

P A Roberts of St Johns Avenue, Pearl Street, Carlinghow, Batley West, writes:

Q I have recently been writing an assembler program for my BBC model B micro, and I would like to know whether it is possible to access VDU 19 from within the assembler (ie without having to revert to Basic).

The User Guide does not seem to give many clues to a solution to the problem, but since almost all the other Basic commands have a simple machine-code equivalent for the assembler programmer I'm sure there must be a machine code form of VDU 19.

If this is so can other functions such as *Mode* and *GCOL* be accessed in a similar way?

A The equivalent of VDU in assembler is:

```
LDA #n
NEWLINE
JSR & FFEE
```

where n is the number you want to use, in your case nineteen. You can repeat this as you need. There is a full table of VDU codes in the manual.

MODEL B IS A BETTER CHOICE

D Nugent of Parkway, Coxhesth, Kent, writes:

Q I am considering buying a BBC computer, but I am unsure of a few points which I hope you would clear up for me. Would the model A have the same graphics capabilities as the B if the A was upgraded to 23K. Also would the programs for the model B *Load* and run in the same way on a 32K model A? Finally what other differences are there between the model A and the model B?

A As far as graphics and programs go then a 32K model A will be able to run model B programs. The essential difference lies in the additional facilities that the model B has for peripherals. The model B has both parallel and serial printer interfaces, and the 'Tube', which allows you to add a second processor to your model B. The second processor does not have to be the same as the on board 6509. At the moment, Acorn is developing a Z80A microprocessor that will be compatible via the tube. This will also make CP/M possible. If you are looking for a computer that can become the centre of an extended system, then the model B will be a much better choice.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

Melbourne House software for the
48K SPECTRUM

The HOBBIT for the 48K Spectrum with 16 page full colour booklet and Hobbit book now available only £14.95.
Orders to Melbourne House, 131 Trafalgar Road, London SE10.
Or call our 24-hour ansaphone for Access orders (01) 858 7397

PROM SERVICES

ZX HARD and SOFTWARE

ZX81	
8K Eprom Board + Eprom 1	£20
Eprom 1 40 toolkit routines	£10
Eprom 2 rapid LOAD SAVE	£10
*Eprom 4 20 routine M C monitor	£10
Eprom 5 Z80 disassembler . . .	£10
Expansion Board 3-way	£15
Graphics Generator including 4K Eprom	£24 50
SPECTRUM	
Eprom Board	£10
16K Ram Pack Adaptor	£5 50
32 Line I O Board (also fits ZX81)	£10
*Tape Version special offer only	[illegible]

Many other ZX products available sae for list

3 Wedgewood Drive, Leeds LS8 1EF (0532) 667183

DRAGON 32 SOFTWARE

Quality software at sensible prices

Caterpillar + Space Attack	£2.95
Meteor Run + Breakout	£3.95
Haunted House	£3.95
Goblin Caves (3-D graphics)	£4.95
Golf (hi-res graphics)	£4.95
3-D Maze	£3.95
Devil's Island (adventure)	£4.95
Pharaoh's Curse (adventure)	£4.95

All prices include p&p
Send sae for complete list

APEX TRADING LTD (PCW)
115 Crescent Drive South Brighton BN2 6SB
Tel: Brighton (0273) 36894
Access Barclaycard accepted

Why pay more?
MEMOTECH 16K Memopak

ZX81 16K RAM pack

Only £28.50

(all inclusive)

Extendable memory – 16K Memopaks may be stacked with other Ram
A quality product – fully guaranteed
As sold at W. H. Smith
Sent promptly by first-class mail

Dept. Pop, BRIDGE SOFTWARE
36 Fernwood, Marple Bridge
STOCKPORT, Cheshire SK6 5BE

Bridge Software

ZX81 INVADERS
In machine code

GALAXY INVADERS (4K Ram)	£4.00
SUPER INVADERS (16K Ram)	£4.95

(includes animated instructions, league table of hi-scores, etc.)
"Deservedly popular . . . excellent"
Popular Computing Weekly
Highest total score of 14 games reviewed in Your Computer for May 1982
"The best on the market" S. C. Beds
"Great game!" S. F. Glos
All-inclusive prices
Sent promptly by first-class post
Full money-back guarantee
BRIDGE SOFTWARE, Dept. Pop 8
36 Fernwood, Marple Bridge
Stockport, Cheshire SK6 5BE

Bridge Software

SOFTWARE AUTHORS

We are a company specialising in the publication of educational software for computer assisted learning in schools, colleges and the home.

If you have written programs, or have ideas that you would like to see developed, we would be very happy to hear from you. We can offer extremely attractive royalties and conditions, and the assurance that you will be dealing with professional educational specialists.

If you would like further details, please write to our Software Development Director.

GARLAND COMPUTING
35 Dean Hill, Plymouth, PL9 9AF

THE TAPE DUPLICATING CO LTD

Europe's largest manufacturer in cassette software

require an enthusiastic young person with an interest in Home Computing and Audio to assist in their rapidly expanding software department.

If you have some technical experience or qualifications PHONE Ken Fletcher on 01-609 0087

DRAGON 32

Five Exciting Games for ONLY £5.40

Hi-res colour and graphics
Fun for all the family
BULLS AND COWS
MAZE RUNNER
HAMURABI
RATTRAP
EARTH DEFENCE

ARGENT SOFTWARE LTD
Midcourt House
Lynwood Chase, Bracknell
Berks RG12 2JT

Dragon Software!
BARNSOFT
32K STARTREK

Save the Universe from the invading Klingons, £6.50.

Barnsoft, 48 Waverley Road, Portsmouth

MONSTER SOFTWARE CLUB
Software library for the DRAGON 32
Top quality cassettes FOR HIRE
All tapes used with the Manufacturer's permission
SAE for details
Monster Software Club
32 Lennox Drive, Lupset Park
Wakefield, West Yorks.

★ 48K SPECTRUM STARTREK II ★

Speed around the galaxy destroying the attacking alien fleets in this fantastic game: it's absorbingly realistic . . . not only must you save mankind but control your spaceship effectively!

LOOK: machine routines, great sounds, dazzling effects, 3D combat, real-time docking (skilful), on-board computer, hi-res damage reports, energy allocation, etc. 10 levels (easy to near impossible). Free Battle Manual. Speedy delivery for just £8.00 from **SONIC SOFTWARE**

5 Sanscliffe Drive, Loughborough, Leics.

ZX81 High Res Graphics Unit

£32 (excl. VAT)

Tel: William Haynes 01-960 0819
Tools for Living
Notting Dale Technology Centre
191 Freston Road, London W10 6TH
cheque/PO (add 15% VAT)
plus 75p p+p

DRAGON 32

New software library.
SAE for details to:
COTSWOLD COMPUTERS
PARK HILL
HOOK NORTON, OXON.

COMMODORE 64 £294 (excl. VAT)
Tel Chris Gomey, Dave Walsh or Floyd Paterson
Tel: 01-969 4655 or send SAE
Image Science Micro Computers Ltd
190 Freston Road, London W10 6TH
or cheques PO (add 15% VAT)
and £5 for p+p

SOFTMART

Up to 50 percent off current price paid for software in perfect original condition with full documentation. Send for spring catalogue of USED SOFTWARE for VIDEO GENIE and APPLE

Price £1 plus SAE

A few cassettes for ZX81, and will purchase software for above machines, plus SPECTRUM and VIC20

DR D. GRAHAM, 11 HASTINGS ROAD BEXHILL-ON-SEA, EAST SUSSEX

BBC MODEL A/B SOFTWARE FOR YOUNG CHILDREN

"A FIRST BOOK OF MICRO-RHYMES"

5 Nursery Rhymes with tunes, moving pictures and sound effects. £4.95 (inc)
Peter Gordon, 20 Despard Road, London N19.

DRAGON INDEPENDENT OWNERS ASSOCIATION

sae for details to

DIOA, School House
Nevern Road, Rayleigh, Essex

ZX81 AND SPECTRUM CONSOLE

Heavy duty black or white rigid plastic. Size 30" × 17". Spaces for computer, printer, cassette recorder, Ram pack, power pack, cassettes, plus extra space for future add-ons. ALL CABLES HIDDEN. Send £11 which includes p&p (state black or white). Delivery by return. Trade enquiries welcome. **Kasel, 2 Rashiere Rigg, Livingston, West Lothian, Scotland. 0506 35132**

DRAGON — 'G' SOFT

Meet Merlin, use the Magic Shield, rescue damsels, try to win a kingdom in "KNIGHTS CASTLE". 9 levels of play + "SKI" for 1 to 8 players. BOTH for £4.95 post free from **3 Beaulieu Avenue, Fareham, Hants. PO16 8TE.**

M & J SOFTWARE

DRAGON COMPANION BOOK £8
Discover 7 extra graphics modes. Take complete control of video memory mapping. Increase the processor speed (not a hardware mode). Append programs from tape. Study the workings of BASIC with the disassembler. Incorporate useful routines from BASIC in your machine programs. Add commands to BASIC.

FORTH LISTINGS £7
6502, 8080/Z80, 6809, 6800, 1802 in stock.

INSTALLATION MANUAL £5
Necessary for implementing FORTH and its editor.

6502 MACRO ASSEMBLER £5
This assembler is written in fig-FORTH and will run on any fig implementation with only one alteration.

MICROTAN IMPLEMENTATION OF FORTH £15
This is a cassette based implementation which consists of the language, its editor and M & J SOFTWARE's 6502 macro assembler.

Cheques and POs to: M & J SOFTWARE, 34 Greys Close Scholar Green, Stoke-on-Trent ST7 3LU. Tel: (0782) 517876

EASIREADER

NEW!

The Greatest Programming Aid Since Fingers
Cut down program entry time
Minimise Bugs by Minimising Entry Errors

The EASIREADER is an attractive, high-quality acrylic plastic stand designed to aid the manual entry of programs from magazine listings, printouts and most books.

99 percent of bugs in programs copied from printout listings are the result of entry errors. The EASIREADER holds the copy at a comfortable angle, avoiding strain, and a specially-designed cursor runs down the program to prevent skipping between complex and similar-looking lines.

It effectively keeps a finger on your current line, especially useful for two-handed keyboard entries and for use with Sinclair computers.

Available now only from BUGBEAR (Patent Pending No. 8232718) at an introductory price of **£12.99** (plus £1.25 p&p).

Send cheque PO or SAE for further details to: BUGBEAR, Dept. W, Nicholson Buildings, Templetown, South Shields, Tyne and Wear, NE33 5RZ.

DRAGON 32 AND SHARP SOFTWARE

Games Pack 1 — Bowling, UFO, Muncher, Micropoly, Mastermind **£6.50**
Games Pack 2 — Race-Chase, Depth Charge, Moto Cross, Glorious 12th, Canyon Bomber. **£6.50**
Games Pack 3 — Tank Battle, Reaction Time, Blind Maze, One Man and His Dog, Life **£6.50**
Games Pack 4 — Poker, Pontoon, Roulette, Stock Broker, Othello (Sharp only) **£6.50**
Devils Triangle — Adventure — Sail to Bermuda but avoid the Devils Triangle where anything can happen **£9.00**
Earth Rescue — Adventure — Search for a rare mineral needed for Earth's survival — space action .. **£5.00**
Maths Tutor — A set of programmes designed to teach maths to children from 3-10 years old .... - **£5.00**

Many other programmes available. SAE for details.

Dragon and Oric programmes wanted. Generous royalties paid.

Send cheque PO or SAE for details to **Abacus Software, 20 Rhosleigh Avenue, Sharples Park, Bolton BL1 6PP**

DRAGON 32 SOFTWARE

EDITOR/ASSEMBLER + MONITOR
Assembler functions include ORG, FCB, FDB, FCC, EQU, RMB and Hex or Decimal addition/subtraction. The ASSEMBLER is of the Two pass Global type. Monitor contains useful routines enabling the user to write and run machine code programs. Supplied on cassette + user manual. £27.65

D.G.T.1
Contains five super games. OTHELLO, BREAKOUT, AWARI, MOONLANDER and RAFFLES.
Fascinating entertainment for all the family. Only £5.75

D.G.T.4 M/code
PTERODACTYL. Destroy all the Eggs before they hatch. Beat off the attacking PTERODACTYLS
TORPEDO RUN. Similar to the ARCADE version. 3D perspective. Ships further away give higher points.
HORNETS. Very fast game. Kill the HORNETS as they emerge, but beware when angry they swoop down firing 'stings'. All three games only £6.95

DISASSEMBLER
The ideal tool to have around. Disassemble the BASIC to see how it works. Make use of subroutines etc.
Supplied on cassette. £11.65

D.G.T.2
M/Code games. **SNAKES.** Kill them before they kill you. Up to 12 giant snakes at one time.
LANDER. Land your craft on the Lunar surface.
INVADERS. 35 Invaders, mother ship, 3 defenders, 9 skill levels. All three games in HI-RES + sound. £8.95

CHESS M/Code
8 Selectable levels of play
Hi-Resolution display of board and pieces.
Cursor control move selection
Specific pieces may be set up to solve chess problems
Supplied on cassette + instructions. £7.95

ALL ORDERS INCLUSIVE. SAME DAY DESPATCH. SEND S.A.E. FOR LIST
J. MORRISON (MICROS), 2 GLENSDALE STREET, LEEDS LS6 1NJ
Callers welcome please phone (0532) 480987

SPECTRUM

WE STOCK MOST OF THE POPULAR SOFTWARE, OFFERING YOU A RETURN OF POST SERVICE (SUBJECT TO AVAILABILITY). SPECIAL OFFER 5 PER CENT DISCOUNT ON ALL SOFTWARE PURCHASED BEFORE FEBRUARY 28, 1983

Examples of our discounted prices: The Hobbit/Master File £14.20. Pimania £9.50. Black Crystal £7.12. Football Manager/Penetrator/ Chess Player/Time Gate £6.60. Inheritance/GB Ltd/Nightflite/Orbiter/ Ground Attack/Gulpman £5.65. Escape/3D Tunnel/Meteor Storm £4.70. P&P 50p (Free for 3 or more items).

We also stock Books, Joysticks, Ad-ons etc.

Send large SAE for price list or telephone for current availability.

IVYSOFT

91 CLEEVE DRIVE, IVYBRIDGE, DEVON.
(07554) 4088

SPECTRUM ** DRAGON ** zx81 (16k)

New for 1983

VOCAB FRENCH and VOCAB GERMAN

A vocabulary of the useful 700 words, from word frequency lists, to put the needed words into your "memory"

State machine and FRENCH or GERMAN together with cheque for £5.00 to cover p&p, to . . .

BOND SYSTEMS

15 BELMONT ROAD, HARROGATE
NORTH YORKSHIRE HG2 0LR

DRAGON BYTE

51a QUEEN STREET
MORLEY
Tel: 522690

Home Computers, Software, Board Games
Mon—Sat 11 am—5 pm

STOCKISTS OF ZX81, SPECTRUM VIC AND ATARI COMPUTERS — AND OTHERS AS WE CAN GET THEM

SOFTWARE, GAMES, EDUCATION ADVENTURES FOR VIC, ATARI ZX81, SPECTRUM ETC, ETC (OUR RANGE GROWS DAILY)

BOARD GAMES GALORE INCLUDING DUNGEONS AND DRAGONS

For more information and details of mail order, ring
KEITH NATHAN 780377
or DAVID TOWN 524543
after 7 pm

in MORLEY to Serve W. YORKS

WANTED URGENTLY

Arcade-type games programs for Spectrum, ZX81, Vic20, Oric, Dragon, BBC Micro and Lynx.
We pay top royalties or buy your copyright for cash.
National mail order and dealer sales ensure you get the best reward for your genius.

Write or call into

NORTHWISH LTD

THE GROUND FLOOR, RALLI BUILDINGS
STANLEY STREET, MANCHESTER
M3 5FD
or Phone 061-832 9143

ZX81, SPECTRUM, DRAGON BBC AND VIC

SOFTWARE LENDING LIBRARY

We have for hire from **50p** (including postage) programmes for your computer.

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, news letter and free hire of 1st programme/game.

Send a cheque or postal order for **£5** to **Software Lending Library,** PO Box 3, Castleford, West Yorks stating name, address, and computer type.

Business Education Ltd

We BUY and SELL

SECONDHAND AND NEW MACHINES
RENTAL OPTION available

Phone: **636 9612 Martin Foreman**

103 Great Russell Street, London WC1

SPECTRUM

HOME FINANCE for the 16K and 48K Spectrum £5.95

Home Finance is one of the best home accounting and budgeting packages available. The program is flexible, easy-to-use (menu driven) and handles numerous accounts, budgets and standing orders/regular payments. Changes can be easily made and reports output to a ZX printer.

THIS PROGRAM IS BETTER THAN SOME ACCOUNTING PROGRAMS COSTING UP TO THREE TIMES THE PRICE

Full instructions are included and there is a FREE after sales "help" service.

Order now for immediate delivery (state whether 16K or 48K). Please make cheques/POs payable to Superior Software.

SUPERIOR SOFTWARE

95 WESTERHAM ROAD
SITTINGBOURNE, KENT ME10 1XG

BACK ISSUES OF PCW

Did you miss any copies of

Popular Computing Weekly

Why not order them as back issues? They are available at 50p each from **Back Numbers, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7RF**

(We are sold out of Volume 1 Nos 2, 6, 7, 10, 11, 12, 13, 15)

PERSONAL COMPUTERS bought for cash. Morgan Camera Co, 160 Tottenham Court Road, London, W1. Tel: 01-388 2562.

DRAGON 32 ADVENTURE GAME. Stop Koas from destroying the world. Only £3.50. M. Sword, 56 Old Road, Baglan, Port Talbot, W. Glamorgan.

DRAGON 32/BBC. Top quality (vyanide) dust covers £2.95 including p&p. D. Ryan, Denison Road, Hazel Grove, Stockport, Cheshire, SK7 6HR.

SPECTRUM KING! You rule a medieval English county and have to work to be promoted and become king. One to six players. 16/48K. On cassette. Only £2.50. D. Bayliss, 26 Elgin Road, Cheshunt, Herts, EN8 8QN.

VIC20 OWNERS. At last! All-action arcade games for the unexpanded Vic at low prices. Written entirely in m/c for exciting colour graphics, animation and sound. Super games cassette — three games on one cassette, Super Breakout, Galaxians and Scrambler. Full feature games with defined graphics, hi-score, free ships and bonus points. Only £4.95. Fast delivery. J. P. Shay, 51 Meadowcroft, Radcliffe, Manchester.

DUST COVERS available for any computer, printer, etc. BBC, TI, Epson, £3.95; Dragon, Atari, Vic20, £2.95; Sharp MZ-80A-K, £4.95. For others please phone or write to Sherborne Designs, Victory House, 8A The Rank, North Bradley, Trowbridge, Wilts. Tel: 02214 4425. Also made-to-measure service. Dealer enquiries welcome. Access and Barclaycard.

BBC SOFTWARE. Centipede, Galaxians, Asteroids, Mutant-Invaders, Starfire, Sliding-Block Puzzles, Startrek, Graphplot, Disassembler, Definer, all originals. Worth £57, sell £25. 0582 757580 after 6 pm.

VIC20 SOFTWARE, high-quality games for expanded or unexpanded machine, from £2. Tel: 0632 372716 (Newcastle).

32K BBC-MICRO games tape; Earth Blockade, Super Simon, Brickbaster (using hi-res, colour); Twenty-One (Teletext), only £3 on high-quality cassette. M. A. Paris, 38 Wooburn Manor Park, Wooburn Green, Bucks.

ALL MICRO OWNERS — filter your power supply and avoid "glitches", filter fitted in two minutes, complete with instructions, £4.50. M. Lamb, 6 Park Street, Scarborough.

DRAGON OWNERS. Make the most of your micro with the following: Dragon Dissambler — converts 6809 machine code into assembly language, either to screen or printer, £5. Dragon Memory Map — gives approximately 550 useful locations/entry points for your dragon, £5. Cassette Catalogue — gives a complete breakdown of a tape's contents, including start, end and excellent addresses of machine code programs, £5. Hires Text — draw upper/lower case text on the P Mode 4 screen, easy to use from Basic, £5. G. Elkin, "Jedarodwin", Newport Road, Great Bridgeford, Stafford.

WHY PAY MORE? Cliffhangaman plus Tabletester for Texas TI99/4A £3.25 for cassette or See for details from J. Shemilt, 1 Aldon Grove, Longton, Preston, PR4 5PJ.

ZX81/SPECTRUM WORKSTATION provides secure, stable mounting and common platform with three power switches for computer, tape recorder, printer, power pack. Prevents memory loss through jolts to system. Price £14.75 all inclusive. Baker MF, Unit 6, Woolsbridge Industrial Estate, Three Cross, Dorset.

DRAGON 32 LISTING SERVICE. Top quality printed listings available on A4 paper to improve documentation and as a last resort back-up copy. Only one penny per program line. Minimum £1. Send your BASIC programs on cassette to: J-SOFT, 2nd Floor, 21 Gold Street, Northampton NN1 1RA.

ZX81 + 16K RAM PACK and Fuller keyboard, all leads and 9v adaptor (over 170 programmes), a real bargain at only £80. For details tel: (0734) 784002 after 6.15 pm.

DRAGON SOFTWARE, Starquest only £5.95, featuring mountains, invaders, caverns, mothership, superb sound and graphics! Quite simply the best game available, also includes Chase the Invader game with fantastic sound. Send to Software, 51 Bankfield Road, Widnes, Cheshire.

ZX81 VIDEO INVERTER. Saves your eyes. Increases safe level, displays sharp white characters on solid black background screen. Kit £4, built £6 (includes VAT and P&P, instructions). Reviewed in *Popular Computing Weekly*, August 26. Send cheque/postal order to D. Fritsch, 6 Stanton Road, Thewall, Warrington, Cheshire WA4 2HS.

16/48K SPECTRUM POOLS PROGRAM. Calculates and prints out expected results. Includes free blank tape for records, £4.95. C5 and C12 cassettes X10, £3.50 + P&P £1.40. 20 labels 60p. M. W. Holman, 60 Camperdown Street, Bexhill, Sussex TN31 5BE.

DRAGON GAME CARTRIDGE PCB (plated through hole, double-sided). Accept two 2516, 2532, 2564, 2716, 2732 or 2764. Eprom copying service provided for only £1 each. Also available: DC-DC converter (5v input to 25v output, current output 50mA maximum, ripple level pk-pk 80mV, measuring only 35mm x 40mm x 19mm. Game PCB £5.50 (full instructions provided, please specify 25 or 27 series). DC-DC converter, £10 (with full specification). Price inclusive of VAT, P&P 60p. K. H. P'ng, 30 Queensbury Road, Alperton, Middlesex HA0 1LU. Tel: Egham (0784) 34300 ext. 208 or 01-997 9708 evenings.

DRAGON GAMES TAPE. Keyboard trainer, Bomber, Moonlander, Grand Prix, Hermes Tracker, £3.50 including p&p, guaranteed. M & M, 163 Westgate, Brighouse.

WANTED. Original software for Dragon/Jupiter Ace, top royalties, Dragon Disassembler, £5, text editor, £5. Tel: 0734 665570.

DRAGON 32 POOLS SELECTOR. Uses sound, graphics, great fun, user friendly. Cassette £2.50, to: S. Neal, 15 Highview Crescent, Hutton, Essex, EM13 1BJ.

ZX SPECTRUM, 16/48K, a clever character, designer, plus six high class games, including Pac Monster, Galaxians, Grand Prix, Catacombs, £3 inclusive. Send to Crown House, Ford, Argyll, Scotland.

DRAGON 32? The Scottish Dragon Club welcomes new members. Send £8 for membership card, free games, tape, newsletter etc., to The Scottish Dragon Club, TF, 1 Walker Street, Edinburgh.

BBC QUALITY PROGRAMS. Low prices, "Chess Clock" (16K), £1.95. "Two-player Blackjack" (32K), £2.45. Datum, 22 Chesterfield Road, Southport, PR8 3JS.

SHARP MZ 80K. Hundreds of games and applications, any 20 of your choice, £5. Details, phone Watford 46955.

SWAP your unwanted software via Software Exchange Club. SAE for details. UKSEC, 15 Tunwell Greave, Sheffield S5 9GB.

ACE INVADERS. A program in Forth for the Jupiter Ace. Fast action, full graphics and sound. Listing £1 or cassette £1.50 including p&p. Forth Dimension, 32 Bathurst, Orton Goldhay, Peterborough.

WORLD INFO, a data base of information about the modern world. Readers all newspapers, students and teachers of Current Affairs, International Relations and Modern Studies need it. Includes wars, areas of tension, top men, types of regime, alliances and much more. For ZX81. Full file on 32K, parts on 16K. Uses Campbell Systems THE FAST ONE. Spectrum version in preparation. £14 from WIMSOFT, 20 Brookside Road, Wimborne, Dorset BH21 2BL.

JOYSTICKS FOR DRAGON 32, essential to games enthusiast or graphic artist, £7 each or £13 pair +50p p/p. Microcare, 1 Oakwood Road, Rode Heath, Stoke-on-Trent, Staffs. Tel: (09363) 5695.

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

Commodores for sale

VIC 20, + cassette deck, + prog aid, + super expander, + Voodoo Castle, + Lightpen, + reference manual, + software Frogger, Blitz, Amok, Space Storm, £295. Tel: Robert, 01-455 1132 (5 pm).

PET/CBM personal computer guide, excellent 500-page book by Adam Osborne on everything about the Pet, £5. Tel: Erith 37437 (evenings).

VIC20 + cassette unit and joystick, super expander cartridge + PacMan cartridge + cassettes + intro to Basic Part 1, £200 ono. Tel: 01-800 0816 extension 268, Mr. Young.

COMMODORE PET 32K Basic 4, superoft, superchip reset switch cassette deck + manuals/books, including Pet Revealed + Pet Sub-routines, £350 ono. Tel: Erith (Kent) 37437 evenings.

COMMODORE 4040 dual disc drives, as new. Holds 174K per drive + disc operating system, manual + leads. Many progs. on discs including Paper-Mate Word Processor, cost £680, bargain at £450. Tel: Erith (Kent) 37437.

COMMODORE ASSEMBLER development system, including mender with documentation, for creating machine code programs. The Disc including Exbro Mon + Super Mon programs for de-bugging, £25. Tel: Erith (Kent) 37437.

VIC20 + cassette unit, 16K Ram, joystick + software, £220 ono. Rochdale (0706) 58670.

VIC 1515 graphic printer complete with 1,000 sheets of paper, £140 ono. Mr Bailey, Chandlers Ford. Tel: 04215 67411 9 am—5 pm.

VIC20 will swap Omega Race cartridge for Gorf or any Adventure. Tel: 061 423 7720, after 6 pm.

SWAP GRANDSTAND MODEL 5000 colour TV game with mains adapter, for any Commodore adventure for Vic20 except Pirate Cove. Tel: Bilton 3057.

VIC20 + CASSETTE 3K super expander + 8K Motherboard, Account Rat Race, Mastermind, Vic Revealed. Lots of other software. All original packing. £250. Tel: 01-952 4397.

Ataris for sale

ATARI 400 (16K) with cassette recorder, Joysticks, "Jumbo Jet Pilot", "Preppie", programming cassette, all manuals, as new, cost £380, accept £290. Tel: 01-691 0649 eves.

ATARI VCS, very good condition, plus 4 cartridges, combat, video olympus, air-sea battle and maze craze, £100. Tel: Keresley (0203) 334557 (evenings).

ATARI VCS plus joystick and paddles, four cartridges including Superman, excellent condition £70. Tel: Gravesend (0474) 64880.

ATARI VIDEO GAME, £120, five cartridges. Tel: Cleckheaton 870089.

ATARI + five tapes in good condition, £95. Tel: 01-699 2875.

ATARI VCS, five cartridges, £115 ono. Tel: Blackpool 866096.

ATARI VCS games system, with six cartridges, Defender, Missile Command, Asteroids, Championship Soccer, Outlaw, Combat, new £230, offers for £115. Tel: 01-997 2017.

For sale

DRAGON 32 + joysticks, brand new, £180. Tel: 01-891 2383 (eves).

SHARP MZ80K, 48K, as new, 11 months old, Sharp assembler, Xtel Basic, 4th, many games. £275 ono. Tel: 01-472 5457 after 5 pm.

TANDY TRS 80 level II, 16K Ram, monitor, cassette, quick printer, stringy floppy, complete with manuals + games progs, £295. Tel: (0253) 891769 (Blackpool).

JUPITER ACE MICROCOMPUTER, £65, works in fourth, all manuals + leads. Tel: Bath 20568 after 4 pm.

GRUNDY NEWBRAIN A/D, brand new, all leads + manuals included, accept offers above £200. Tel: Hayle 754845.

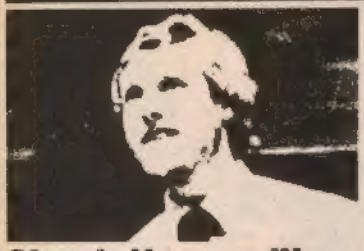
SHARP MZ80K, 48K, green screen, extended Basic + software, excellent condition, £285 + carriage. Tel: 0229 37853.

SUPERBOARD II, Cegmon, Basic I, Premier Screen up to 64 x 32, Basic V, Toolkit II, encoder, sound board, + software including Scramble, AD, Invaders, cost £830, sell £400 ono. 01-200 7028 (6 pm).

DRAGON 32. Unwanted gift still in box. Complete with Dragon Special Selection 2 Tape. Cost £200, will sell for £170. W. Hendry, 81(b) Lothian Street, Bonnyrigg, Midlothian. Tel: 031-663 5450.

VIDEO GENIE, 16K, 12 inch black and white TV converted for use as monitor, manuals, leads, books and software, worth £160 plus — all for only £280 ono. Phone Kidlington (Oxon) 77488 evenings.

Ziggurat



Simulating reality

A computer simulation is a copy, in numerical form, of some abstraction from reality.

Take population growth: as Malthus noted, if there are no checks then the growth of population is exponential in form. This can be copied if we abstract from reality by forgetting births and deaths and only concentrating on the increase in size at a constant rate.

If R is the rate and P is the original population size (already set), we can compute the size of successive years' populations by one line:

```
FOR I = 1 TO 20: P = P * R: PRINT I, P: NEXT I
```

The same line can be split into four separate lines for machines such as the ZX81. If you try different values for R, you will be able to see how quickly such a population would grow — if nothing else happened.

A different approach to simulating (sometimes called modelling) population growth is used by the program normally called *Life*. Many versions have been written but the basic program is listed in *Basic Computer Games* by David Ahl (1978), based on an idea by Martin Gardner in *Scientific American* of October 1970.

The original version of *Life* used a number of counters — itself a simulation — which were added to or subtracted from, according to three rules. Any counter with two or three neighbours survives; every counter with four or more neighbours is removed (or 'dies'); and every empty cell, with *exactly* three counters adjoining, has a counter placed upon it (is 'born'). From different starting configurations of counters, different sets will have different life histories: some populations even die out.

The *Life* program is a helpful reminder that, just because something has always happened before, nothing *has* to happen in the future.

Consider the growth in the number of computers. Over the last three years they have grown at a rate of about, say, 49 percent (the figure is a guess), so that in 20 years the number of computers will be about 2,000 times the number at the beginning of the three years. If 1 percent of the population had a computer at the start of the three years, that means in 17 years there will be 20 computers per head. Not likely.

Of course, things might be different. If the total population is T (say 100 units) and the number of people with a computer is P, then the number of people who might buy a computer is $T - P$. The likelihood of a computer being purchased depends upon how many are without computers (ie $T - P$).

Suppose, therefore, that the number of new purchasers depends on the present number of owners and non-owners and some constant. So, if I is the number of new purchasers $I = K * P * (T - P)$. Assuming we have values for K, T, and an initial value for P, we can program:

```
1000 FOR J = 1 TO 20: I = K * P * (T - P)
1010 PRINT J, I + P, (I + P)/P: P = P + I: NEXT J
```

which will list the time period, new population, and the ratio between the new population and the previous population of computers. (Note how the purchasers have become a *population* of computers?)

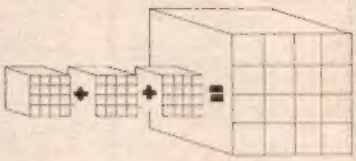
If you set $K = 0.005$, $P = 1$, and $T = 100$ then the growth rate (the final column) starts at 1.495, then 1.493, then 1.488, and after six years it is still 1.475. By year 10 the population is 30.463. Even by year 20 the population is only 99.407: not 2000.

Really, this new model is too simple — but it is better than the first attempt. What we really want is an even better one . . .

Boris Allan

Puzzle

Cubed beginning



Puzzle No 41

The number 153 has the following unusual property. If each of the digits is cubed and these cubes are added together we arrive back at the original numbers:

$$1^3 + 5^3 + 3^3 = 1 + 125 + 27 = 153$$

Can you find any other numbers with this property?

Solution to Puzzle No 36

Starting with zero and one, each term in the Fibonacci series is formed by adding together the preceding two terms, eg:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, . . .

The following program generates the first 20 terms of the Fibonacci series, and displays the result of dividing each term by the preceding one. The value so obtained converges on the 'golden' number.

```
10 LET X = 0
20 LET Y = 1
30 FOR N = 1 TO 10
40 PRINT X, X/Y
50 LET X = X + Y
60 PRINT Y, Y/X
70 LET Y = X + Y
80 NEXT N
```

The value of the 'golden' number is: 0.61803399 . . . Stability in the 8th decimal place is shown by the convergence of the 9th decimal place.

Winner of Puzzle No 36

The winner is: D Pain, Yew Tree Lane, Rotherfield, East Sussex, who receives £10.

Top 10

Atari

1(2)	Astro Chase	(First Star Software)‡
2(7)	Preppie	(Adventure International)
3(1)	Air Strike	(English Software)
4(–)	Galaxians	(Atari)*
5(–)	Canyon Climber	(Data Soft)
6(4)	Shamus	(Synapse)
7(–)	Pac-Man	(Atari)*
8(5)	Jumbo Jet Pilot	(Thorn EMI)*
9(–)	Hellcat Ace	(Microprose)§
10(3)	The Scott Adams Adventures	(Adventure International)†

*Cartridge. †24K cassette. ‡32K cassette. §48K disc.

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

ZX81*

1(2)	Frogger	(DJL Software)
2(5)	3D Defender	(JK Greye)
3(3)	Gauntlet	(Columnatic)
4(4)	Flight Simulation	(Psion)
5(8)	Gulp II	(Campbell Systems)
6(1)	Black Crystal	(Carnell Software)
7(–)	Sea War	(Panda)
8(–)	Adventure 1	(Abbersoft)
9(–)	Mazogs	(Bug-Byte)
10(–)	ZXAS	(Bug-Byte)

All 16K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Spectrum

1(1)	The Hobbit	(Melbourne House)*
2(2)	Penetrator	(Melbourne House)*
3(–)	3D Tunnel	(New Generation)
4(–)	Arcadia	(Imagine)
5(–)	Flight Simulation	(Psion)
6(–)	Spectrum Chess	(Artic)
7(7)	Spectral Invaders	(Bug-Byte)
8(9)	Hungry Horace	(Psion)
9(6)	Escape	(New Generation)
10(4)	Orbiter	(Silversoft)

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Vic20

1(3)	Grid Runner	(Llamasoft)
2(–)	Abductor	(Llamasoft)
3(9)	Blitz	(Commodore)
4(2)	Jellymonsters	(Commodore)*
5(–)	Gorf	(Commodore)*
6(4)	Andes Attack	(Llamasoft)†
7(1)	Traxx	(Llamasoft)†
8(6)	Hopper	(Rabbit)
9(8)	Myriad	(Rabbit)
10(–)	Shark Attack	(Romik)

*Cartridge. †Requires 8K or 16K.

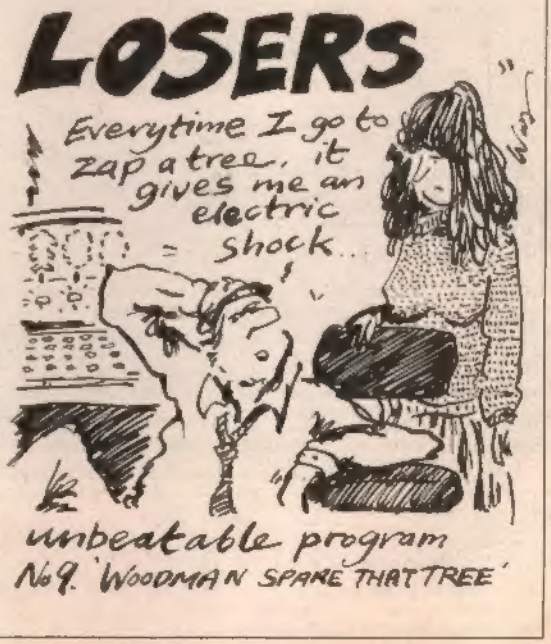
(Figures compiled by the Vic Centre, London 01-992 9904)

Books

1(–)	Creative Graphics on the BBC Microcomputer, *Cownie*	(Acornsoft)
2(2)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Macmillan)
3(5)	Discover Forth, *Hogan*	(Osborne)
4(6)	Programming the 6502, *Zaks*	(Sybex)
5(9)	Z80 Assembly Language Programming, *Levanthal*	(Osborne)
6(–)	Over the Spectrum, various authors	(Melbourne House)
7(7)	Basic Programming for the BBC Micro, *Cryer*	(Prentice Hall)
8(–)	Graphs and Charts on the BBC Microcomputer, *Harding*	(Acornsoft)
9(8)	Spectrum Book of Games, *James et al*	(Granada)
10(–)	Illustrating Basic, *Alcock*	(Cambridge CUP)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

(Last week's figures in brackets)



upgrade to an ORIC-1

16 colours professional keyboard full graphics real sound

- Superb styling
- Choice of 16K, or 48K RAM
- Ergonomic keyboard with 57 moving keys
- 28 rows x 40 characters high resolution
- Teletext/viewdata compatable graphics
- 6 octaves of real sound plus Hi-Fi output
- Centronics printer interface and cassette port
- Comprehensive user manual

FOR HOME, EDUCATION, BUSINESS & ENTHUSIASTS.

OPTIONAL MODEM OFFERS COMPUTER PHONE LINK FOR: ELECTRONIC MAIL ● TELESOFTWARE ● PRESTEL

COMING SOON TO COMPLETE YOUR SYSTEM: ORIC MICRO-DRIVE DISCS & SPEED PRINTER

FROM £99.95 incl VAT

ORIC is no toy! Its professional keyboard, Basic language and extensive specification, will do all you expected of your home computer, plus a whole lot more. For home, educational, business and games use.

If you're buying for the first time beware! Only ORIC computers offer full colour capability for under £100 and the most powerful and comprehensive micros in their price brackets.

So whether you're just starting out, or upgrading existing equipment, make the professional decision and choose ORIC. Send for our comprehensive brochure NOW, or better still, order your ORIC today.

Delivery is around 28 days with a money back guarantee if you're not delighted.

Clip the coupon below, or call our telesales number ASCOT (0990) 27641.

ORIC-1

The Real Computer System

ORIC PRODUCTS INTERNATIONAL LTD Coworth Park Mansion, Coworth Park, London Road, Sunningdale, Ascot, Berks SL5 7SE.

Prices include VAT			
	ORIC-1 16K RAM	£ 99.95	
	ORIC-1 48K RAM	£169.95	
	ORIC Communications Modem	£ 79.95	
	Postage and Packing		£ 5.95
	TOTAL		£

*Please delete/complete as applicable.
*I enclose a cheque/P.O. payable to: ORIC PRODUCTS INTERNATIONAL LIMITED for £_____

Please charge my Access, Barclaycard Amex, Diners Club account no.

Name

Address

If you require a brochure please tick ☐ PCWW